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# GRAMMAR OF CHANGES

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First Edition

Made and Printed by  
**TIMES-MIRROR PRESS**  
LOS ANGELES  
1944









# GRAMMAR OF CHANGES

I - INTRODUCTION - THE CUBE - This book deals with the changes of certain regular, geometrical figures, of lower & high-dimensions & polarity & discovers laws of the utmost generality. The study begins with what is most familiar, the Cube, a figure in three dimensions (or principals = ways) with two poles (= sexes) in each principal, called G-2.

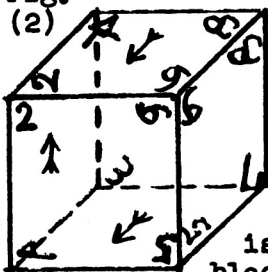
First make the tablocks (Vex & Cave) as explained in "TROPERMIC CALCULUS"

Here (Fig.1) we show the Idemfactorial total-Convex Tablock. You see the "bottom" or "y" face, Upright = 1357; the "back" of "I" = 2165 & the "left" or "A" face = 4321.

Below (Fig.2) is the Cube in the "standard" position to indicate the relationship of its eight points(#s) or corners= vertices & in (Fig.3) see the same from the "front" upright = 8743, the "O" face. The Upright "U" face = 6824; upright "E" = 6587.

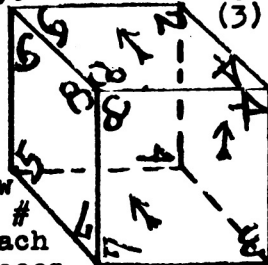
Each general face = side comprises four particular or exact-faces, governed by the four corners, respectively.

Fig. (2)



Thus, each side has four different postures = upright(U), prone (P), averse(A) & supine(S)-by the slope of the arrow when the immediate # is, itself, upright. Each block has 24 exact - faces.

Fig. (3)



Fig(4) shows the Vex Tablock; on face of this Upright- the "mediate"

Vex  
Re-  
of  
is  
Vex  
Be-  
Fig  
see  
one

the  
lock,  
the Immedia-

Fig(4)

three female metals of the the bottom, or immediate view we see (8743), or "0" Vex (U-O-V; on "back" or "mediate" face of this

view is (6824) = Upright-U- & on the left, or mote face this view Prone-E- = (5768). low in (5) we (the male & female) faces of Concave Tab- with (5713) as te face = U-Y-Cave;

(6521) as the Mediate U-I-Cave & (8765)

Remote face = right E Cave.

On page 3, in Fig (6) we

see the two female metals

of the cave tablock & the other male

face; viz -

(4231) =

Supine A Cave

(8473) =

Supine O Cave

(6284) =

Supine U Cave.

On the tablocks all forty-eight exact faces are numbered, on each side or metal &

face = as the Up-

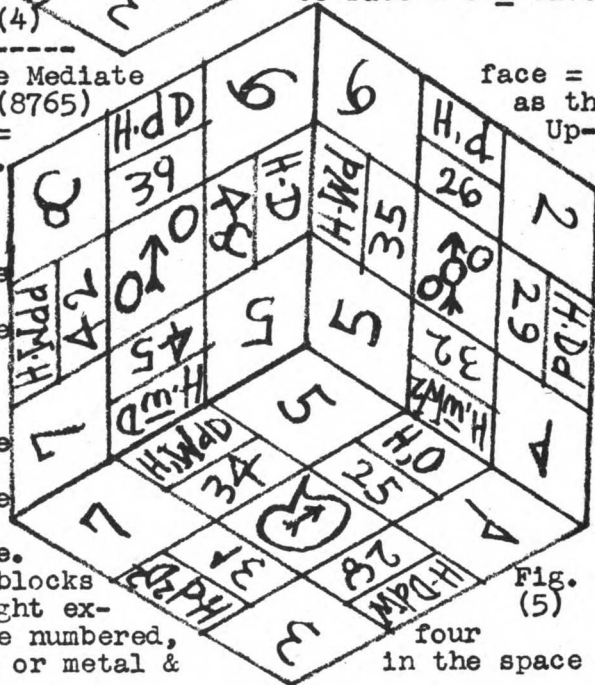


Fig. (5)

four in the space

above the number of the exact-face is the name of the trope or turn which the No.1 face = U-Y-V face. Thus, the No. 1 face is reached by a zero (0) turn from itself; the No.2 face reached by MINOR DEOSIL turn, which rolls the block toward observer one single, or ple, singul- turn of 90°.

No.12 face = Supine-A-Vex reached from idemfactorial a MAJOR DEOSIL turn, the tablock, one singular the right. The No.24 face the idem. by a MAJOR WIDDERSHINS, which rolls the block one quarter toward the left. The No.20 face= Averse-O-Vex is reached from No.1 by a MINOR WID- DERSHINS which rolls one quarter, away from the ob- server. Thus, there are two dimensions in which to roll- (1)- the vertical, or forward & backward = away & toward, called MINOR & (2) the horizontal, or leftward & rightward, called MAJOR; then there are two directions (signs or senses) in each dimens- ion, the forward & leftward being called WIDDERSHINS, while the backward (toward) & rightward are DEOSIL.

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Fig (7)

	Major	Minor
Deosil -	D	d
Widdershins -	W	w

face is named or written in terms of the combination of singular turns &/or the horizontal reflection, which is symbolised by H, which is placed before each trope on the cave tablock, to mean that before making the said turn, first make a horizontal re- flection of the No.1 face = U-Y-Vex = 1 3 5 7 .

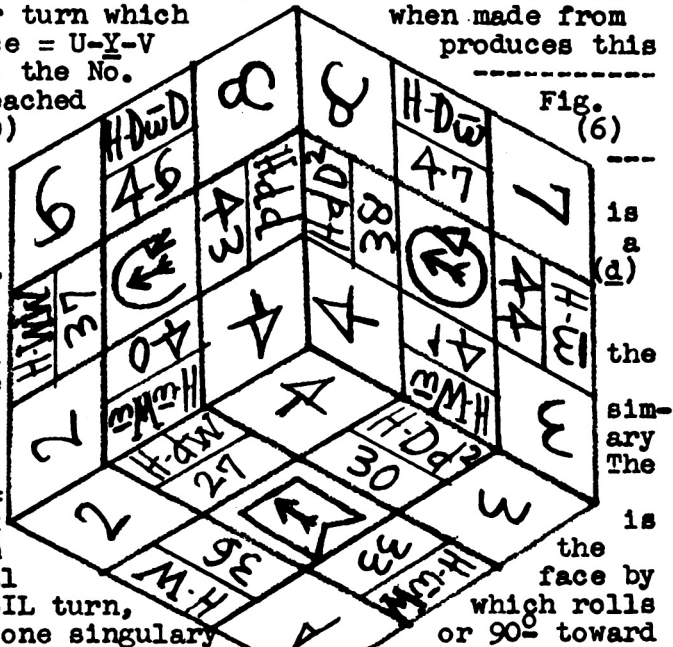


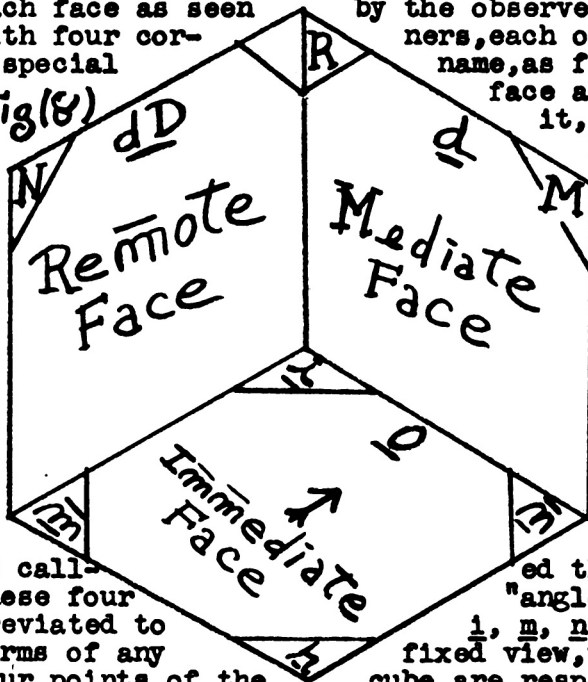
Fig. (6)

is a (d) the sim- ary The is the face by which rolls or 90° toward

All of the 24 exact-faces on one tablock are reached from No.1 by combinations of these four singular turns; thus, each

Posture arrows are marked on each side of the tablock; the arrow on a salt face points to the male quicksilver metal; on quicksilver & sulphur faces the arrows all point toward the female salt metal. Each face as seen by the observer is a square with four corners, each of which has a special name, as follows. Of any face as you look at it, the upper left-hand corner is called the immediate point; the lower left-hand corner is the mediate #; the upper right-hand corner is the neoteric # & the lower right-hand corner

Fig(8)



is called the remote #. These four "angles" are abbreviated to  $\underline{i}$ ,  $\underline{m}$ ,  $\underline{n}$  &  $\underline{r}$ ; then in terms of any fixed view, the remaining four points of the cube are respectively "reciprocals" of these first four #s when they are the other end of the cubic diagonal- reciprocals are written as capital letters in the figures (8) & (9). A standard view of three faces of the block relates these three as shown in the pictures as Immediate Face, Mediate & Remote. Thus the Immediate or  $\underline{i}$  face has the  $\underline{i}$ ,  $\underline{m}$ ,  $\underline{n}$ , &  $\underline{r}$  #s; the Mediate face has the  $\underline{R}$  # for its own  $\underline{i}$ #, the original  $\underline{i}$ # is its  $\underline{m}$ #, the reciprocal of the original  $\underline{m}$ # is the  $\underline{n}$ # of the mediate face & so on. The face reached (See Fig 9) from the  $\underline{i}$  face by a double major turn, as  $\underline{WW}$  or  $\underline{DD}$  is called the major reciprocal face & if the immediate

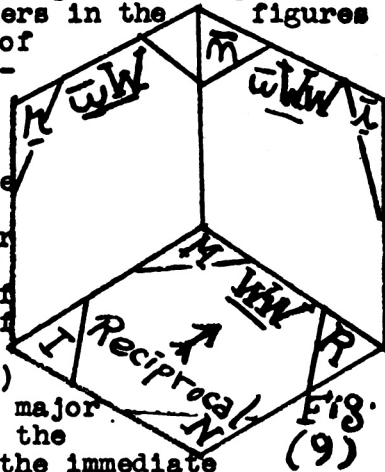


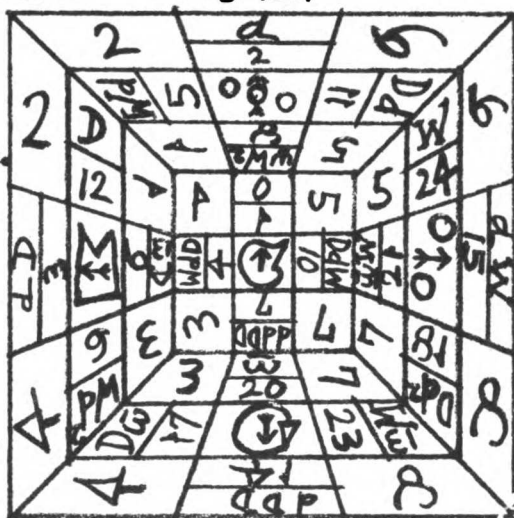
Fig. (9)



face be upright, then the major reciprocal is also upright; if the immed. face has a horizontal posture, it will be reversed -Fig (10)-

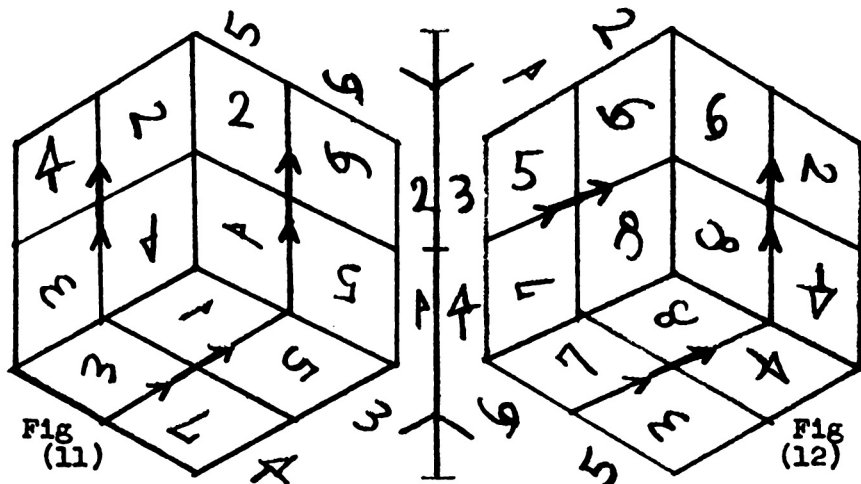
on the major reciprocal face, thus, e.g., the major reciprocal face of Supine I Vex is Prone O Vex, & so on.

When we make a picture of the cube showing five faces as in Fig (10) it is called a Logical Frame. Here, in Fig (10) the face in the center of the view is U-Y-Vex, whose 1# is #1; with this No.1 face as immediate, the mediate face is No.2,



Upright I Vex & the Remote face is No.3 = Up.A-Vex. These three faces, counting widdershins around the 1#, making O, d, & dD turns to reach them, are the first three faces or degrees of the rational cradle of all 48 faces & together constitute what is called an Astral Toperm of the first three degrees; when these three are known the whole posture of the block is fixed. These three can be calculated when the first, or immediate face is adequately named, so that by knowing this name we can set the tablock in the position, or "total-posture" with this given exact-face as immediate & its own immediate point in the proper corner. Having done this, we will know precisely where every other point of the cube is located, since the block is rigid, & just which one of the four postures is shown on any one of the six sides, as we turn to it through any possible series of turns. Thus, in the view of Fig (10) which is named from the face in the center & therefore called Upright Y Vex, we see that the four angles of the immediate face are respectively as 1, m, n, r 1 3 5 7. This specific enumeration of the four #s of G-2, in this sequence, is called the PUNCTUAL PERM of the face & from it we can calculate all the categories of the particular total-posture, as given.

## II - TRIGRAMMIC ANALYSIS - In the pictures here we



show the cube (vex) from two different viewpoints such that in Fig (11) we see the three male & in Fig (12) the three female metals of the convex tablock; the metals are indicated by the numerals, 1, 2; 3,4; 5,6 marginally & the #s are numbered within. In Fig (11) the three topermic faces are: immediate 1 3 5 7; mediate 2 1 6 5; remote 4 3 2 1; in Fig(12) they are (imm) 8 7 4 3; (med) 6 8 2 4; (rem) 5 7 6 8. Male metals are represented by odd numbers or yangs (—), & female metals by even numbers or yins(— —). In the 2nd degree cube, viz G-2, the total-posture is adequately expressed when we state or imply the four #s of the immediate face, so that we can write them without error in the 1, m, n, r # set, as #1357 for Fig (11) & #8743 for Fig (12), above. This same thing is effected if we write the metals of the three faces (1, m & r), in which case we have the sexed-principal components of the exact-face which is also the rational index of the total-posture uniquely. In the case of Fig (11), or 1357, the astral toperm is (faces) 1-m-r = 1 3 5; with Fig(12) = 8743, it is 4 2 6. These three astral digits in each case are called, respectively, A V H, i.e. the Astral, Vertical & Horizontal components. The A is the sexed-principal or metallic component of the immediate face; with Fig (11) it is Y, silver, or 1 = male salt; with Fig (12) it is O, tin, or 4 = female quicksilver. The astral, metallic, or sexed-principal

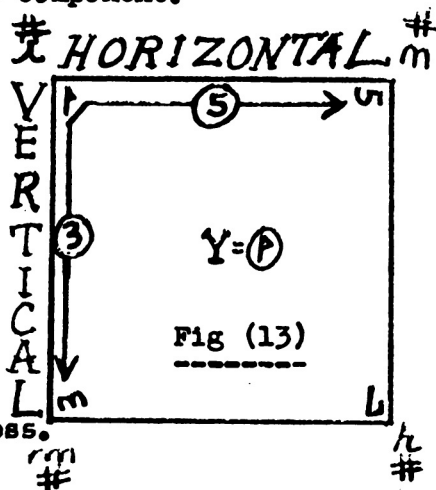
constituent (A) of the toperm is the metal whose gram occurs in the trigram of each # of the punctual perm of the immediate face. Thus, with Fig (11) = 1 3 5 = 1 3 5 7, the 1, m, n, & r #s are represented respectively by the following four trigrams.

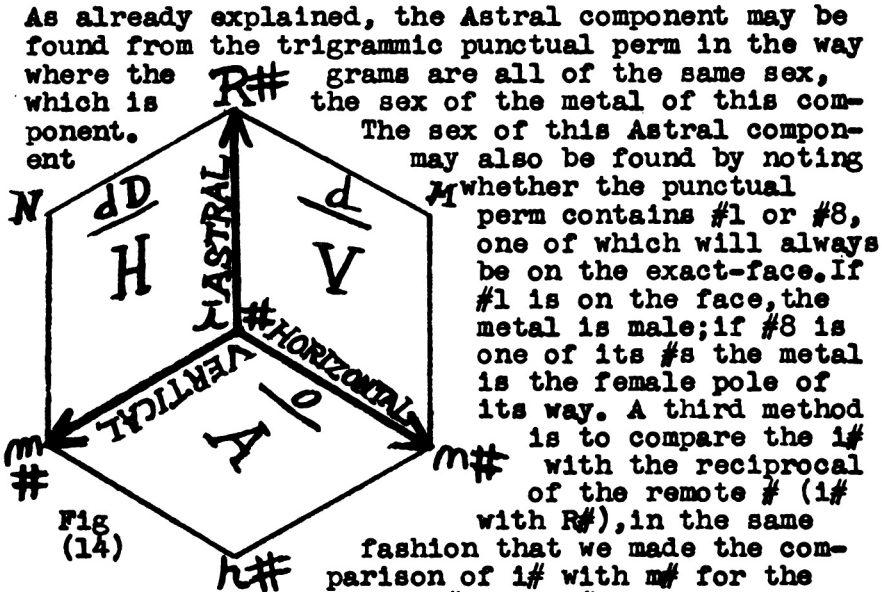
<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>	Sulphur
<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>	Quicksilver
<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>	Salt
1=#1	m=#3	n=#5	r=#7	Fig (11-bis)

Here we see that a yang (——) persists throughout the salt principal or way.

Now, when the #s are written, as above, with trigrams in the horizontal sequence, imnr, with their grams, respectively, in the vertical sequence, reading from the bottom up, QJX = Salt, Quicksilver, Sulphur, as above; then we shall find the Vertical Component of the exact-face, or toperm, in that way (principal) where the poles or sexes of the grams do alternate one at a time, viz- yang-yin; yang-yin as here in Quicksilver; when the yang comes first as here, the sex is male, but if the alternation is yin-yang, yin-yang where the yin appears first then the sex of the metal is female; in the first instance the 1# is always less than the m# & the n# is always less than the r#. Since the relative differences are always the same, we need consider only the 1 & m #s for this. If this difference is 1, the metal is of salt, if the difference is 2, it is of quicksilver & if 4, then sulphur. Above, since 1 from 3 is 2 it is J & since 1 is less than 3 it is male J = I = 3, the vertical component.

The horizontal component is found by comparing the 1# with the n#, or what amounts to the same, the m# with the r#; it is always found in the way where the grams alternate in sex two at a time, as, here, in sulphur where we have two yangs followed by two yins, the first pair showing the sex of the metal, viz, male of sulphur = A = 5; #1 from #5 = 4, hence sulphur & 1 is less.





$\Delta$  is the Astral = the sexed-principal component of the Immediate Face & also of the Astral Crystal = 1#-R.  $\underline{V}$  is the Vertical = metal of the Mediate Face, also of the vertical crystal = 1#-m.  $\underline{H}$  = Horizontal component = metal of the Remote Face, also of the horizontal crystal = 1#-n. In terms of the idemfactorial face of G-2, then, we have the following table of correspondences.

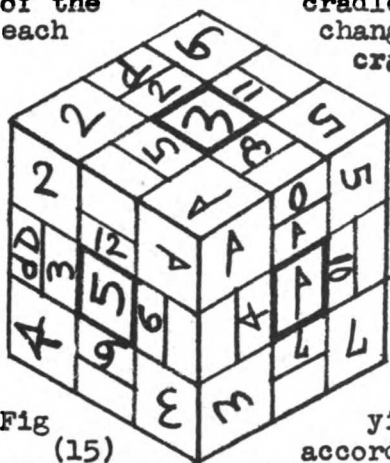
Faces	Points	Toperm	This is of Fig (11);	
-----	1-m-n-R	A V H	now, of Fig (12) the	
-----	-----	-----	analogous correspond-	
Immed.	1 3 5 2	1 3 5	=	A V H
Med.	2 1 6 4	3 2 5	=	V a H
Rem.	4 3 2 8	5 2 4	=	H a v
(Here we use instead of the regular punctual perm, the "crystal toperm."				
	A = 8 7 4 6	= 4 2 6	=	A V H
	V = 6 8 2 5	= 2 3 6	=	V a H
	H = 5 7 6 1	= 6 3 1	=	H a v.

Face = U-Q-V.



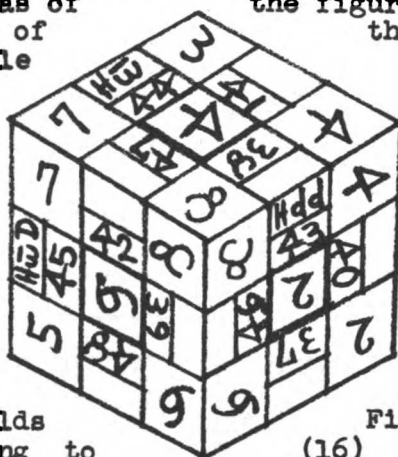
III - METALIC CRADLES - This is a table of all the metals in a figure, arranged as an array of particles with the principals (ways) for its major parameter & the poles (sexes of the principals, or degrees of the figure) for its minor parameter.

The idemfactorial cradle is such that according to a conventional selection of digits from the cradle we get the idemfactorial exact-face of the figure. Then, since there are the same number of changes of the cradle as of the figure the change of the cradle yields the



Fig

(15)

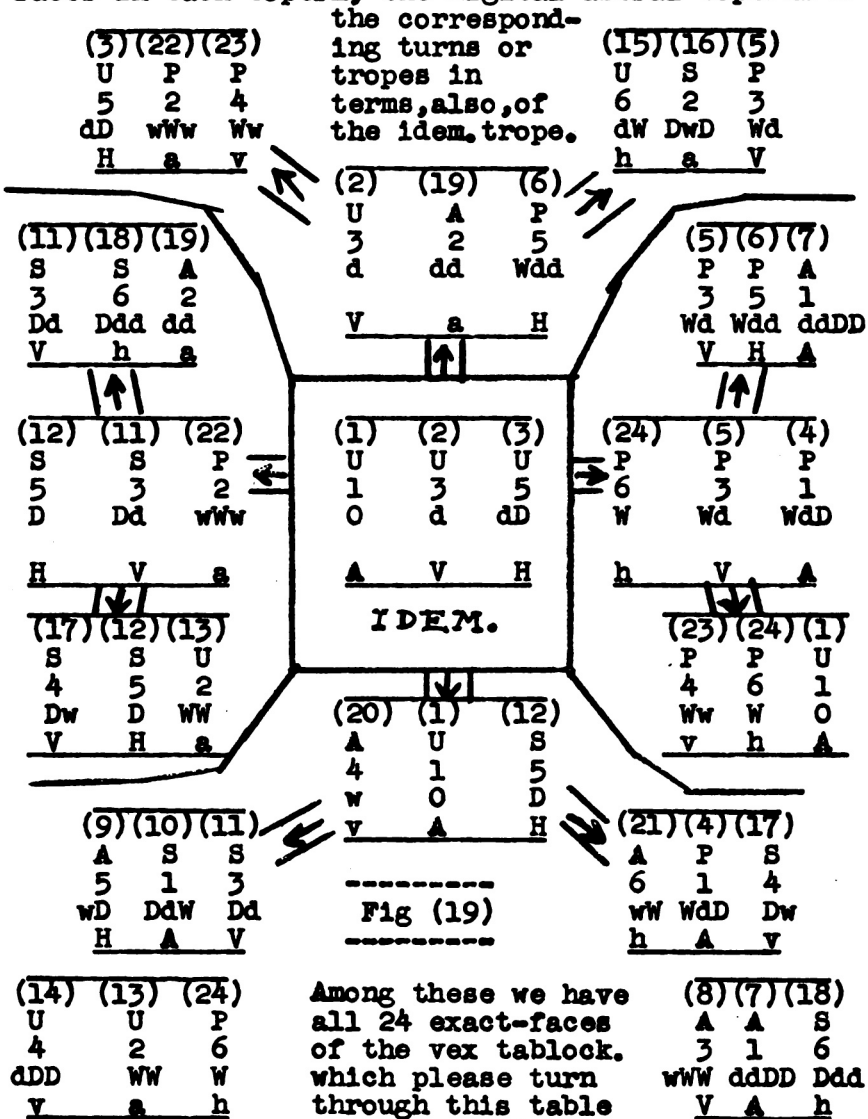


Fig

(16)

Fig (15) yields according to the same convention- al selection of digits that exact-face which is the immediate index of the corresponding change of the total-posture of the figure. The No.1 & idemfactorial face of G-2 = 1 3 5, whose punctual perm is 1 3 5 7. If we write the reciprocals of these metallic digits beneath the identicals as in Fig(17) we have the idemfactorial form of the metallic cradle of G-2. If now we change this idem by a simple transposition of the two minors without any major alteration we have the cradle change as in Fig (18) which represents the change from Fig (15) to Fig (16), where we take 2 4 6 = 8 6 4 2 as the immediate face = No.43, with No.44 as the mediate & No.45 as the remote. Here, for practice, we note that the crystoperm is 2 4 6 8 7 6 4, where 8 7 is the astral component = female salt (2); 8 6 is the vertical = female quicksilver (4) & 8 4 is the horizontal = female sulphur (6); the crystoperm of 1 3 5 for AVH = 1 2 3 5 = 1 R m n #s, similarly.

IV - LOGICAL FRAME OF THE 22 TOPERMIC FACES AROUND UPRIGHT-Y-VEX PLUS THE TWO EXTRA FACES- showing the degrees in the AVH sequence in terms of the unit &/or idemfactor as AVH- with the numbers of the exact-faces, respectively, the postures of the three(1,m,r) faces in each toperm, the digital-astral toperms &



In the Fig (20), below, we see the same arrangement as in Fig (19), above, showing the immediate, mediate & remote faces of each particular total-posture of the tablock (vex), with the astral digit postured on each face, respectively. Counting the "bottom", "back" & "left" of each block we have the toperms. The first ("bottom") digit of each being the Q turn, the second ("back")

turn & the third turn, being the d ("left"), the whole is as shown in the Key (21) below only degree immediate face of is

Fig(21)

start the the =135 make or deosil reach of 325 is the the then there by D

(A) of 524 which the Idem. from 135 by (w), we get is the y of the by a d we go to = 513 which the Idem with the The for an do the

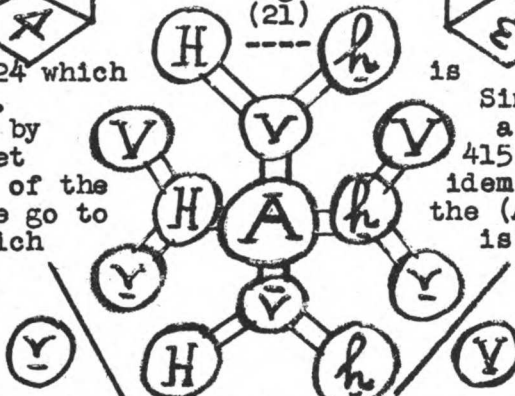
the cave tablock, making its scheme properly.

Fig (20)

Fig (21)

Thus in if we with (A) of Idem then the d minor turn, we the (A) which (V) of Idem; from we go to the

is the H of Similarly, a minor wid, 415 & its (A) idem; from there the (A) of No.9 is the H of & so on others. student exercise same with



V- TABLE OF 0, 1, 2, 3, 4, 5, 6 TOPERMS WITH DIGITAL PARAMETERS AS EXPLAINED BELOW- (Fig 22) -

	3	3	4	4	5	5	6	6
	---	---	---	---	---	---	---	---
	ASS			APS		AUS		
V-1-A	513	613	514	614	315	415	316	416
		PPP			PPA			PPU
H-1-P	531	631	541	641	351	451	361	461
	---	---	---	---	---	---	---	---
		USP		UPP		UAP		
V-2-U	523	623	524	624	325	425	326	426
	SSP	SSP	SSS	SSS	SSA	SSU	SSA	SSU
H-2-S	532	632	542	642	352	452	362	462
	---	---	---	---	---	---	---	---
V-3-U	...	...	...	...	135	235	136	236
H-3-S	...	...	...	...	153	253	163	263
	---	---	---	---	---	---	---	---
V-4-A	...	...	...	...	145	245	146	246
H-4-P	...	...	...	...	154	254	164	264
	---	---	---	---	---	---	---	---

The digits here are in the AVH sequence; in a few cases we have put the corresponding postures above the digits; the student can fill in the remaining postures. The mediate corner of the table has no perms, for in any perm either the vertical component is 1,2,3, or 4 or else 1,2,3, or 4 is the horizontal component. Should 5 or 6 be the V or H, then the H or V would necessarily be 1,2,3, or 4. The parameters show the second digit of the toperm according to the rule such that where the minor index shows V the 2nd digit comes from the minor parameter (1,2,3, or 4); on the H ranks the 2nd digits come from the major parameter (3,4,5 or 6). In every case the 3rd digit comes from the other parameter than that from which the 2nd is chosen as prescribed. Thus, e.g. with 532 = Spine A Vex, the horizontal 2 is less than the vertical 3, hence the posture is horizontal & with 2 it is supine. Details of posture analysis are given in Book Ta-Khu, Tropermic Calculus, etc; here we will give a summary for reference. Consider the three component degrees, as A V H, then if V is less than H the posture of A is vertical; if H is less than V



the posture of A is horizontal; if the vertical is 2 or 3 the posture of A is upright; if it is a vertical posture with 1 or 4 as the vertical it is averse; if it is a horizontal with 2 or 3 as that horizontal it is supine, if 1 or 4 it is prone.

VI - TABLE OF POSTURES FOR THREE DEGREES OF TOPERMS  
ARRANGED AS IN THE GRAND 48-fold CRADLE, IDEM-  
FACTORIAL - beginning with Upright-Y-Vex & going  
widdershins around the immediate #. - Fig (23)-

<u>V E X</u>				<u>C A V E</u>			
<u>Male</u>		<u>Female</u>		<u>Male</u>		<u>Female</u>	
<u>S U L P H U R</u>							
<u>Remote</u>							
P S S P	P S S P	P S S P	P S S P	P S S P	P S S P	P S S P	P S S P
<u>Mediate</u>							
P P S S	S S P P	S S P P	S S P P	S S P P	P P S S	P P S S	P P S S
<u>Immediate</u>							
U P A S	U S A P	U S A P	U S A P	U S A P	U P A S	U P A S	U P A S
<u>Q U I C K S I L V E R</u>							
P A S A	P U S U	P A S A	P U S U	P A S A	P U S U	P U S U	P U S U
A P A S	U S U P	A S A P	U P U S	A S A P	U P U S	U P U S	U P U S
U P A S	U S A P	U S A P	U P A S	U S A P	U P A S	U P A S	U P A S
<u>S A L T</u>							
U U U U	A A A A	U U U U	A A A A	U U U U	A A A A	A A A A	A A A A
U U U U	A A A A	U U U U	A A A A	U U U U	A A A A	A A A A	A A A A
U P A S	U S A P	U S A P	U P A S	U S A P	U P A S	U P A S	U P A S

Inspection of this table gives the following rules.

(1) For Immediate Faces - in all three principals - both flexual & sexual changes reverse horizontal postures only- (m) For Mediate Faces - flexual change (Q) changes nothing (J) & (X) reverses the horizontals only; a sexual change (Q) reverses the verticals (J) reverses all postures (X) reverses the horizontals; (r) For remote faces - a flexual change does nothing- a sexual (Q,J) reverses verticals.

## VII - EFFECT OF DISPLACEMENTS ON ASTRAL COMPONENTS-

A flexual change, viz- reflection (horizontal) affects only the remote face which then becomes its reciprocal. A sexual change reciprocates the immediate face, repeats the mediate & reciprocates the remote; thus a reflex multiplies by a polar 5 & a reciprocal by 6. E.g., with 2 5 3 which is S A A, the reciprocal is 1 5 4 whose postures are P U U. Here the horizontal S has been reversed to P; the vertical A to U both in the V & H digits. The immediate 2 is reciprocated to 1, the mediate 5 is repeated & the remote 3 is reciprocated to 4.

VIII - TABLE OF POLAR DISPLACEMENTS - viz- when we multiply by the polar perms, respectively, we make the following series of changes from the multiplicand to the product.

<u>Multiplier</u>	<u>E f f e c t</u>	<u>Fig (24)</u>
(1)= (111)	- <u>n o c h a n g e</u>	= (1) x (1)
(2)= (211)	- flexual & sexual	= (5) x (6)
(3)= (121)	- flexual & aversion	= (5) x (7)
(4)= (221)	- sexual & aversion	= (6) x (7)
(5)= (112)	- flexual only	= (5) x (1)
(6)= (212)	- sexual only	= (6) x (1)
(7)= (122)	- aversion only	= (7) x (1)
(8)= (222)	- flex,sex & averse	= (5)x(6)x(7)

By (7) aversion of posture the particle is moved to the opposite vertical or horizontal place in the same sex, as when prone becomes supine, or upright becomes averse; or vice versa. By (6) a sexual change or reciprocation, the particle moves to the same ordinal place in the opposite sex, as when No.1 becomes No.13; No.17 becomes No.5, etc. By (5) a flexual move the face is reflected horizontally to the other (reflex) tablock, as when No.10 becomes No.34; No 33 becomes No.9 & so forth.

IX - TABLE OF PRINCIPAL TRANSFORMATIONS - To consider abstractly permutation of the principal components of a toperm without polar change of the digits is to observe the effect of multiplying by one of the six triples, as by -

(1 2 3)	(1 3 2)	(2 1 3)	(2 3 1)	(3 1 2)	(3 2 1)
-1-	-2-	-3-	-4-	-5-	-6-
-----	-----	-----	-----	-----	-----

Note that the principal perm does not change the immediate # of the face, for since we find the 1# by counting the sexes of the digits in the QJX sequence, the given sequence of digits is apart from the resulting sequence of sexes. - Fig (25)-

- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -
A V H	A H V	V A H	V H A	H A V	H V A
-----	-----	-----	-----	-----	-----
<u>0</u>	<u>H-DdW</u>	<u>H-wwW</u>	<u>Wd</u>	<u>wD</u>	<u>H-W</u>

X - GRAND IDEMFACTORIAL 48-FOLD CRADLE showing the flexual,sexual,posture & principal location of the immediate faces asnumbered in the closed-integral astralit. Fig-(26)-

(1)	V e x		F L E X		C a v e	(2)
-----	-----	-----	-----	-----	-----	-----
(1)		(2)	S e x	(1)		(2)
M a l e		F e m a l e		M a l e		F e m a l e
-----	-----	-----	-----	-----	-----	-----
			P o s t u r e s			
U P A S		U S A P		U S A P		U P A S
(1)(2)(3)(4)		(1)(2)(3)(4)		(1)(2)(3)(4)		(1)(2)(3)(4)
-----	-----	-----	-----	-----	-----	-----
			S u l (3) p h u r			
3	6	9	12 15 18 21 24	27 30 33 36	39 42 45 48	
-----	-----	-----	-----	-----	-----	-----
			Q u i c k (2)	S i l v e r		
2	5	8	11 14 17 20 23	26 29 32 35	38 41 44 47	
-----	-----	-----	-----	-----	-----	-----
			S a (1) l t			
1	4	7	10 13 16 19 22	25 28 31	34 37 40 43 46	
-----	-----	-----	-----	-----	-----	-----

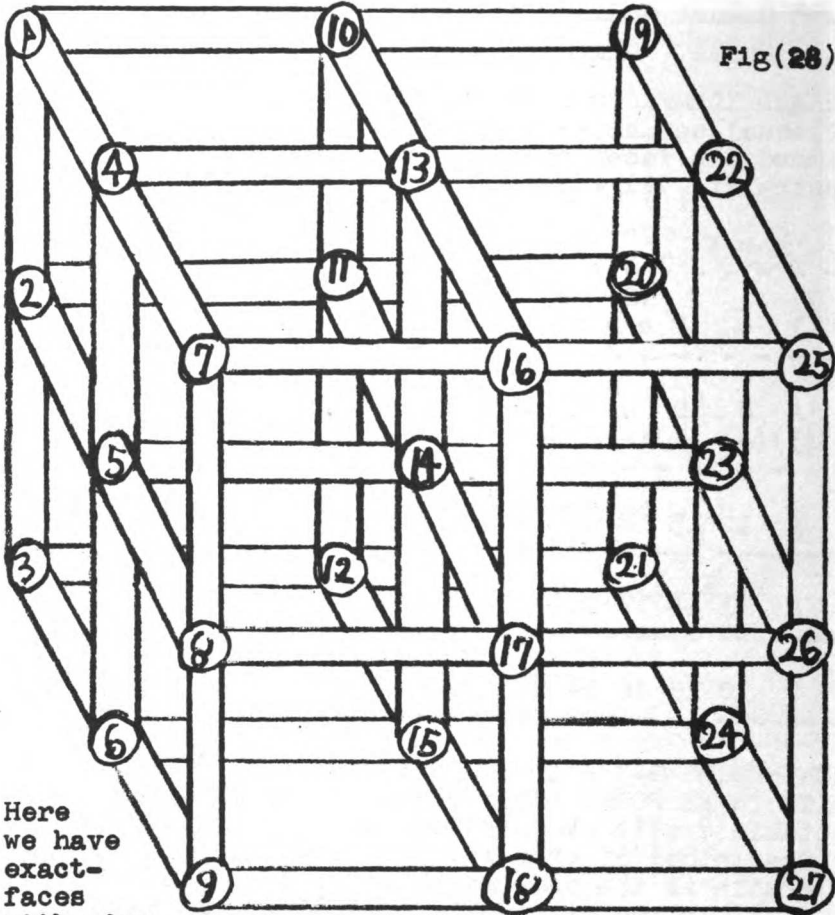
X<sub>I</sub> CONCERNING G-3 = A FIGURE IN THREE PRINCIPALS WITH THREE POLES (degrees) IN EACH PRINCIPAL- The metallic cradle of this figure is shown in Fig (27). The method of changing this metallic

--- cradle is the same as that for G-2, viz-

Q	J	X	
1-(1)(4)(7)			permutation of principal files times
2-(2)(5)(8)			permutation of the minor parameter in
3-(3)(6)(9)			each major separately. In G-2 we had

6 principal perms x 2 x 2 x 2 = 8 polar perms, making 48 cradle perms; in G-3 we have the same number of principal perms(6) but there are 6 x 6 x 6 = 216 polar perms, hence 6 x 216 = 1296 cradle perms & the same number of changes of the G-3 figure, as in Fig (28) page 16.

In Fig (28), below, we illustrate in outline the  $3^0$  cube, or G-3, seated in what would be the U-Y-V posture if it were G-2, viz. with the bottom up. The exact-faces of G-2 are point-sets with four #s.



Here  
we have  
exact-  
faces  
with nine

#s on each, as, e.g. 1-4-7 10-13-16 19-22-25, shown at the top here & 7-8-9 16-17-18 25-26-27 at the back, the former upright, the latter averse "0". Note the principal differences; between consecutive salt #s the difference is 1; between quicksilver #s it is 3 & between sulphur the difference is 9. The three poles in each dimension need a new nomenclature, as, e.g. male, neuter & female, or, simply,



(1),(2) & (3),using numerals conveniently instead of yaos or grams.

XI-GRAMMIC MULTIPLICATION IN G-2 - With bi-polar grams if the two factors are of the same sex the product is male, viz- a yang (—); if they are of the opposite sex, it is a yin (— —). Thus in Fig (29) here, we have the times table of monograms.

----- It is evident that the multiplication is commutative;  $1 \times 2 = 2 \times 1$ .

	1	2							
	x-----								
1-	1	2	_____	times	_____	=	_____		
2-	2	1	_____	x	_____	=	_____		
			_____	x	_____	=	_____		
(In numerals			_____	x	_____	=	_____		

we use 1 for a yang & 2 for a yin.) When multiplying trigrams together, for our purpose here, we put together the grams in the same principal of both multiplier & multiplicand; in the following table the multiplier is on the minor margin & the multiplicand on the major parameter, the numbers standing for the trigrams or #s from 1 to 8.

- Fig (30) - TRIGRAMMIC TIMES TABLES - G-2.

This is also called the Logical Apron of # 1 - G-2. The student should learn this table by		#	1	2	3	4	5	6	7	8
			111	211	121	221	112	212	122	222
			---	---	---	---	---	---	---	---
			1	2	3	4	5	6	7	8
			2	1	4	3	6	5	8	7
			3	4	1	2	7	8	5	6
			4	3	2	1	8	7	6	5
			5	6	7	8	1	2	3	4
			6	5	8	7	2	1	4	3
			7	8	5	6	3	4	1	2
		8	7	6	5	4	3	2	1	

further analyses of G-2 grammic products see Book G-W, B-W, etc. The polarity of G-2 is a duality; hence, transposition is its only permutation. With G-3 there is a trinity of poles; hence there are as many polar perms as there are principal perms, viz- six, which are symbolised severally by the same six triples as tabulated at the bottom of page 14. The multiplication, like that in G-2 can be one pole by one pole (monogrammic) or three by three (trigrammic); in both case it is non-commutative, for  $2 \times 3$  does not necessarily =  $3 \times 2$ , for reflexions reverse the sequence of rotations, from probite to rebite.

### XIII - Fig (31)- METALIC TIMES TABLE OF G-3 FOR ROTATIONS-

The meaning of this is that we start with the multiplicand & count forward as many poles as the multiplier, counting the multiplicand itself as "1". The process is "Cometary". Thus, as shown here, Fig (32) extend the series

1 2 3 1 2 3 1 2 & so on in every direction, then we see that ,e.g. 2 x 3 begins with 3 & counts 2, thus--

1	2	3	1	2	3	1	2	3
3	1	2	3	1	2	3	1	2
2	3	1	2	3	1	2	3	1
1	2	3	1	2	3	1	2	3
3	1	2	3	1	2	3	1	2
2	3	1	2	3	1	2	3	1
1	2	3	1	2	3	1	2	3

Multiplicand = 3 ( 1 2  
Multiplier = 2 # #  
Hence, "1" "2"  
Product = 1.

Or, e.g. 3 x 2, begins with 2 & counts, 1, 2, 3, thus--

1 2 3 & so, arrives at "1".

### XIV - Fig (32) - TIMES TABLE OF TRIPLES, VIZ, OF EITHER POLAR PERMS OR PRINCIPAL PERMS - G-3 -

	(1)	(2)	(3)	(4)	(5)	(6)
	123	132	213	231	312	321
x---	---	---	---	---	---	---
(1)-123	(1)	(2)	(3)	(4)	(5)	(6)
(2)-132	(2)	(1)	(4)	(3)	(6)	(5)
(3)-213	(3)	(5)	(1)	(6)	(2)	(4)
(4)-231	(4)	(6)	(2)	(5)	(1)	(3)
(5)-312	(5)	(3)	(6)	(1)	(4)	(2)
(6)-321	(6)	(4)	(5)	(2)	(3)	(1)

Here, the products may be obtained by using the algorithm, thus- e.g. 3 x 4 = 6.

Multiplicand= 2 3 1

Idemfactor = 1 2 3

Multiplier = 2 1 3

Product = 3 2 1.

Connect the digit of the multiplier with the same digit to be found in the idem, then put down in the product beneath the digit of the multiplier the same digit which is above the same digit in the idem. Thus, here, 2 connects with 2 & brings down 3; 1 goes with 1 & brings down 2; 3 goes with 3 & brings down 1. Thus, the ratio between the multiplicand & the product is the same as that between the idem & the multiplier. The times algorithm is a proportion or equality of ratios. The six triples constitute a "group"; 123 =(1) is the identity operator. Two numbers whose product is (1) are called "inverses"; here each number except (4) & (5) is its own inverse; (4)&(5) are mutually inverse. Except with (4)&(5)-inverses, there is no commutation.

XV - CHANGES OF G-3 - Every change of the figure has its corresponding change in the cradle & the toperm which expresses this change & describes the total-posture or change of the figure. In Fig. (28) page 16, we have an outline picture of G-3, which we transfer, now, to the technically idem-factorially postured change as shown below in Fig. (33).

The two-dimensional matrix (cradle) which for this three dimensional figure (G-3) is the idem-factorial cradle of G-3, as given here in Fig(33-bis) below.

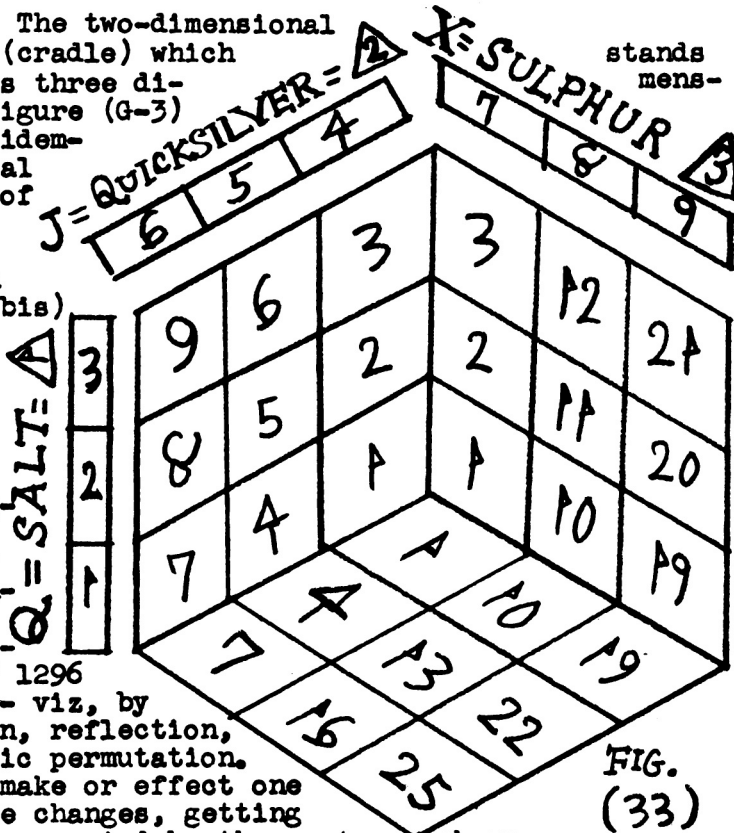
-----  
1 4 7  
2 5 8  
3 6 9  
-----

The figure, as already explained, is susceptible of 1296

changes- viz, by rotation, reflection, & metallic permutation.

Let us make or effect one of these changes, getting that represented by the posture shown on page 20 in Fig (34), whose cradle will be as given here in Fig (34-bis). In Fig (33), the idem, the 1# is #1; counting from the 1# the

8 3 5 A-crystal which is perpendicular to the  
9 2 4 Immediate Face of this total-posture, we  
7 1 6 have #1-2-3; the V-crystal which is per-  
----- pendicular to the Mediate face = #1-4-7;  
& the H-crystal which is perpendicular to the Remote  
Face = #1-10-19. Given these three, then by polar-  
differences we can enumerate the whole posture.





XVI - HOW TO FIND THE NUMBER OF A POINT - In the two figures below the #s of G-2 & G-3 are tabulated with the metals as parameters. There are as many different ways of doing this as there are factors, or combinations of factors in each array of

		points, viz-			
Fig(36)		in 8 & 27.		Fig (35-bis)	
G-2)	X		G-3)	X	
Q J		5 6	Q J		7 8 9
1 3		1 3 5 1 3 6	1 4		1 4 7 1 4 8 1 4 9
2		2 3 5 2 3 6	2		2 4 7 2 4 8 2 4 9
1		1 4 5 1 4 6	3		3 4 7 3 4 8 3 4 9
2 4		2 4 5 2 4 6	1		1 5 7 1 5 8 1 5 9
			2 5		2 5 7 2 5 8 2 5 9
			3		3 5 7 3 5 8 3 5 9
			1		1 6 7 1 6 8 1 6 9
			2		2 6 7 2 6 8 2 6 9
			3 6		3 6 7 3 6 8 3 6 9

Thus, for G-2 we could make a rectangular table with 8 majors & 1 minor = a linear table; or we could have 4 majors & 2 minors; or 2 majors & 4 minors as we have above, or, finally, 1 major & 8 minors. With G-3, the combinations of major & minor would be as follows: 27,1; 9,3; 3,9 (which we have); 1,27.

In the G-2 table we have eight particles or #s, which we have divided each into six parts; in G-3 we have 27 #s each divided into nine parts, to show the metallic, cradular correspondence. The minor margins in both cases are sectioned for clarity; in full

the parameters of the G-2 table would be, for the 2,4 style, as shown in Fig (36-bis).

The full indices of the G-3 parameters are shown below in Fig.(37). It thus becomes clear just how each point is a combination of metals, one from each principal of the figure. Now, to make the calculation which will give the same result got by the parametric method, we simply work with the same facts that are disclosed by the tables themselves & make up in each case a permutation using the PLUS-ONE ALGORITHM with which the student is familiar. (See Book Ta-Khu, Tropermic Calculus, etc.) It will be easiest to take the degrees or places of the perms in the XJQ sequence, male & female. Then, with G-2 we have the places

Fig (37)

Let us		X	J	Q	(prin.)
take as	Possible Occupants	1	2	1	2
a perm of	Places	5	6	3	4
G-2, the	Occupancy Formula	2	x	2	2
combination of	Moduli	4	2	1	1
metals as in (7), e.g.		6	4	1	1
viz- Qjx = YOE = 146	or Digits =	(1)3	5		
The choice cradle is	2(4)6	2	2	1	
Ordinal Remainders	=	1	1	0	
Ordinal-Remainders x Moduli	=	4	2	0	

Verifying the result by the reverse method, we have, dividing successively by the particular moduli,  $4 \sqrt{\frac{146}{4}} = 1 + 1 = 2$ nd choice for 1st place = (6)

$$2 \sqrt{\frac{146}{2}} = 1 + 1 = 2$$
nd choice for 2nd place = (4)

$$1 \sqrt{\frac{146}{1}} = 1$$
st choice for 3rd place = (1)

$$\frac{1}{0}$$

Hence the perm = (6)(4)(1), Q.E.D.



These are imprimitive perms, there being in the case of G-2, six candidates to fill all three places, but each particular place has only two of these from which to choose. Now, with G-3 we have nine candidates or metals, three places to fill, each of which has a choice of one at a time from a particular three out of the nine, the plus-one algorithm being built up as follows, for, say, #16 = 168, or - in the XJQ sequence, 861 - the metallic perm. The choice cradle is the same as the metallic, (7,8 or 9)(4,5, or 6)(1,2, or 3).

$$\begin{array}{r}
 3 \quad x \quad 3 \quad x \quad 3 = 27 \text{ (Occupancy Formula)} \\
 \hline
 9 \qquad \qquad 3 \qquad \qquad 1 = \text{Moduli} \\
 \hline
 \boxed{8 \qquad \qquad 6 \qquad \qquad 1} = \text{Digits of Perm} \\
 \hline
 \begin{array}{lll}
 \text{2nd} & \text{3rd} & \text{1st} = \text{Ordinals Chosen} \\
 1 & 2 & 0 = \text{Ordinal Remainders}
 \end{array} \\
 \hline
 (1 \times 9) + (2 \times 3) + (0 \times 1) = 0 - R \times \text{Moduli} \\
 = 9 \quad + \quad 6 \quad + \quad 0 + 1 = \#16 \text{ the } \underline{861} \text{ perm.}
 \end{array}$$

Verify by reversing the algorithm as follows.

Moduli

$$\underline{9} \quad \#16 \quad \underline{1} + 1 = \text{2nd } 7, 8, 9 = (8)$$

$$\begin{array}{c} 9 \\ 3 \end{array} \quad \underline{7} \quad \underline{2} + 1 = \text{3rd of } 4, 5, 6 = (6)$$

$$\begin{array}{c} 6 \\ 1 \end{array} \quad \underline{1} \quad \underline{1} = \text{1st of } 1, 2, 3 = (1)$$

$$\begin{array}{c} 1 \\ 0 \end{array}$$

Therefore the perm = (861), Q.E.D.

Thus, by the plus-one algorithm we are able to find the number of the # when its constituent metals are given & when the # alone is given we are able by the reverse of the plus-one algorithm to find the component metals.

XVII - ERECTING THE GEOMETRICAL FIGURE (G-3) WHEN

----- THE CRADLE PERM IS GIVEN - For example -

Fig(38)- Inspection of the cradle as shown in

----- Fig (38) here will disclose any #

8 1 6 = 1# that we wish to know ; so that

9 3 5 = central # you may understand

7 2 4 = I#(reciprocal of 1#) this yet more

----- clearly, we will put the particles of this change of the idem in the proper idemfactorial

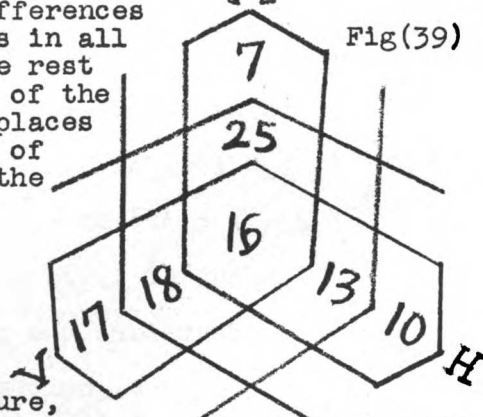
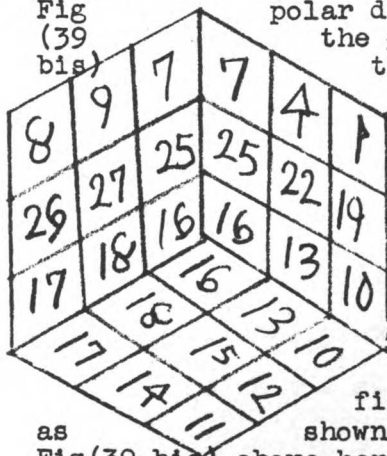
places of Fig (35) as follows---Fig (38-bis)-----

6			5			4		
1	3	2	1	3	2	1	3	2
8	9	7	8	9	7	8	9	7
26	27	25	25	22	19	17	18	16
17	18	16	16	13	10	17	18	16

We can read these triples up or down & get the triad of metals which = the # which occupies each of the 27 places or points of the 3rd degree cube in the given change thereof. The critical #s are those of the three topermic crystals, A, V & H, which in the idem are #s 1,2,3; 1,4,7; 1,10,19; here we find in these same places #s 16,25,7; 16,18,17; 16,13,10, which we proceed to arrange properly in the framework of the geometrical figure, as shown in Fig(39).

Then we can calculate by comparative A polar differences

Fig (39) the #s in all the rest of the places of the



as shown in the completed view, Fig(39-bis) above, here; thus 16 from 18 is 2, so  $2 + 13 = 15$  for the center of the bottom; 10 from 16 = 6, hence 18 minus 6 = 12 & so on. Or we can simply fill in the numbers, using the idemfactorial frame where instead of #1 we put #16; instead of #2 we put #25; instead of #3 we put #7; instead of #4 we put #18, & so on. When the geometrical figure is already numbered completely & we wish to determine its metallic cradle, we simply reverse the above described process, by writing the metallic triads of enough #s, so that we can tell which principals & metals thereof occupy the cradular places.

816 The three metals in supposititious salt are  
 935 those of the first major, 897; those of the  
 724 supposititious quicksilver are 132; those of  
 supposititious sulphur are 654; hence arrange  
 these on the margins of the cube as in the picture,  
 Fig (40) below. We see then that the metal on the

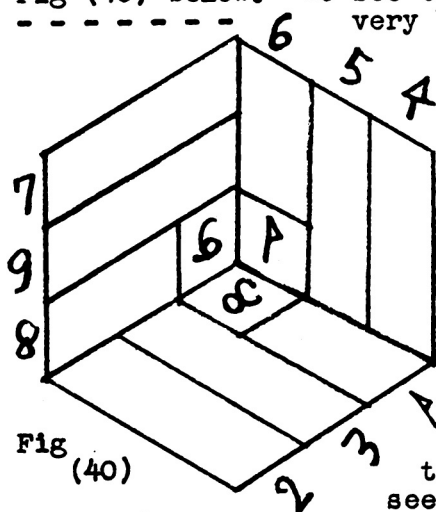


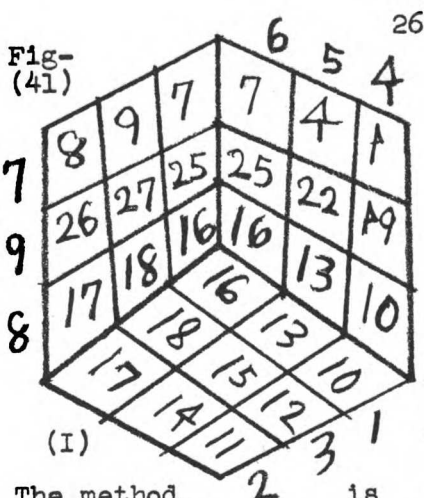
Fig  
(40)

very bottom, instead of (1) of salt is the second sulphur metal, viz- (8); the metal on the very back, instead of (4) the first quicksilver metal is the first salt metal which is (1); the metal on the very left instead of the first sulphur (7), is the third quicksilver, (6); the # in the #1 place, then is that which has the metals, 8-1-6; look at the table of Fig (37), where these three metals meet & see the 8 on the major margin, & the 16 on the minor & the particle indicated is (16) = #16 to go in the #1 place of the G-3 figure. The # directly above this combines the metals 916, hence is #25 & so on, with the rest. Now, with #16 in the first place & postured so that the whole figure has the cradle as shown in the upper left hand (immediate) corner of this page (25), suppose we wish to find out what # occupies the 15th place (as of the idem), all we need do is put our finger on the 15th place (as of the idem) & note what # is there, namely, the middle of the "top", whose metals will be 7 3 5 = #6. Another & better way is to use the algorithmic method, but we must use the whole cradles in the algoperm, as follows. When an

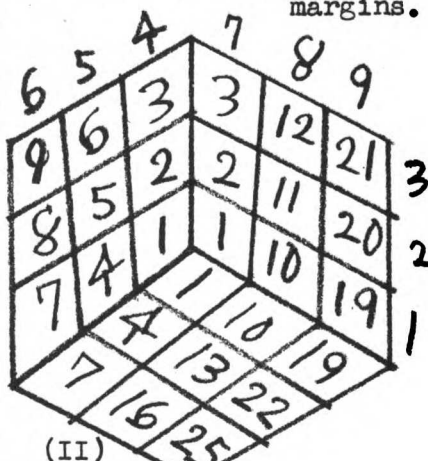
#16	#1	#15	#6
M-card	M-plier	Idem	Product
8 1 6	/ 1 4 7	3 5 8	/ 7 3 5
9 3 5	/ 2 5 8	1 6 9	/ 8 2 4
7 2 4	/ 3 6 9	2 4 7	/ 9 1 6
(I)	(II)	(III)	(IV)

algorithm of this type is considered as something whose terms (I, II, III & IV) can be permuted, then we call

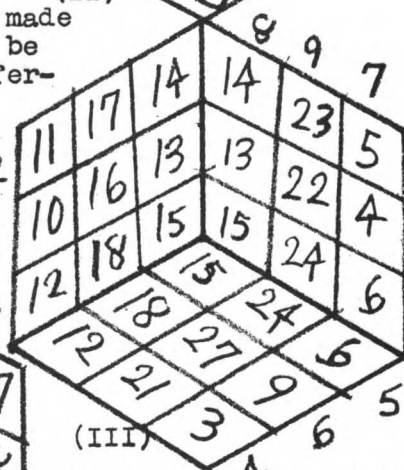
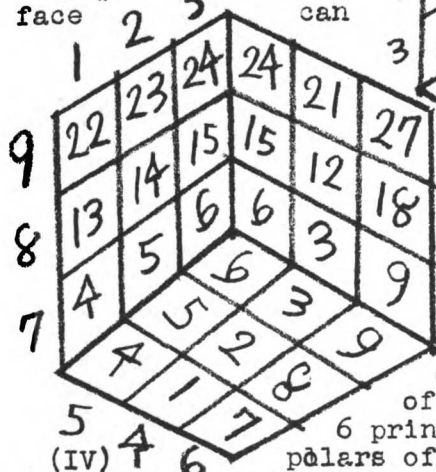
it an algoperm, which is in its idem an equality of ratios such that I is to IV as II is to III, or, here, #16 : #6 :: #1 : #15; where #15 x #16 = #6 x #1.



Here we show the algo-  
perm with the four  
terms of G-3 postures  
punctually completed  
with their metallic  
margins.



The method is  
as already described.  
Begin & work systematic-  
ally with the A, V & H  
crystals, or if these  
cannot be found, then any  
row of three will do if  
co-ordinate rows can be made  
so that whole faces can be  
calculated by polar differ-  
ences; that is, all that  
is needed is to have  
two rows to cross  
each other on each  
face, then the other  
four #s of the  
face can



always  
Note that each of the  
27 different #s can be  
in the 1st place 48  
times, each time with a  
different total-posture  
of the figure; for there are

6 principal perms x 2 x 2 x 2  
polaris of the 2nd & 3rd minors =  
48 & 27 x 48 = 1296 total-postures of G-3.

XVIII - CONCERNING D-2, A GEOMETRICAL FIGURE WITH  
FOUR PRINCIPALS (Ways) & TWO POLES IN EACH-

The most common four-dimensional figure is called a Tetrak & is illustrated in Fig (42), below. Since it is bipolar its points can be represented by using grams (yangs & yins), four for each point, making a Tetragram for each of its sixteen #s. The first

three ways are those with which we are familiar, Q(1), J(2), (X), 3,

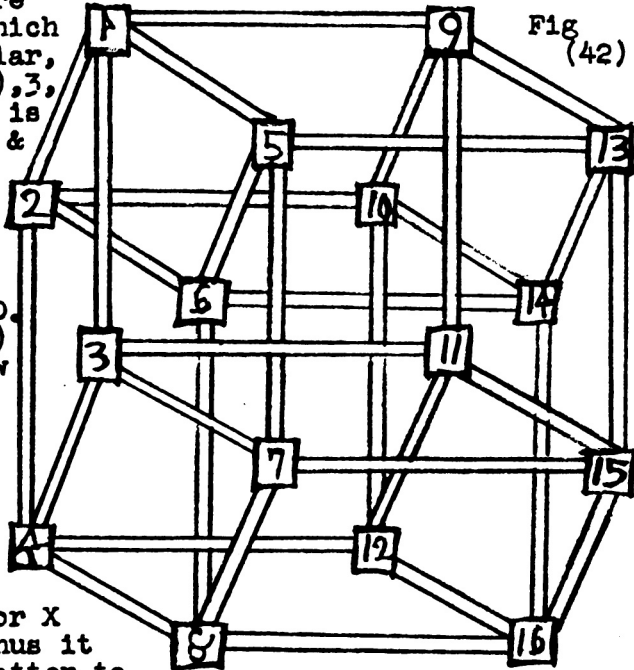
& the fourth is called D (4) & its metals are Nickel (7) or (N) & Zinc (8) or

(Z), the female pole of D.

In Fig (42-b) below we show the successive dichotomies which produce the sixteen #s.

The polar differences are 1 for Q, 2 for J, 4 for X & 8 for D. Thus it is an easy matter to

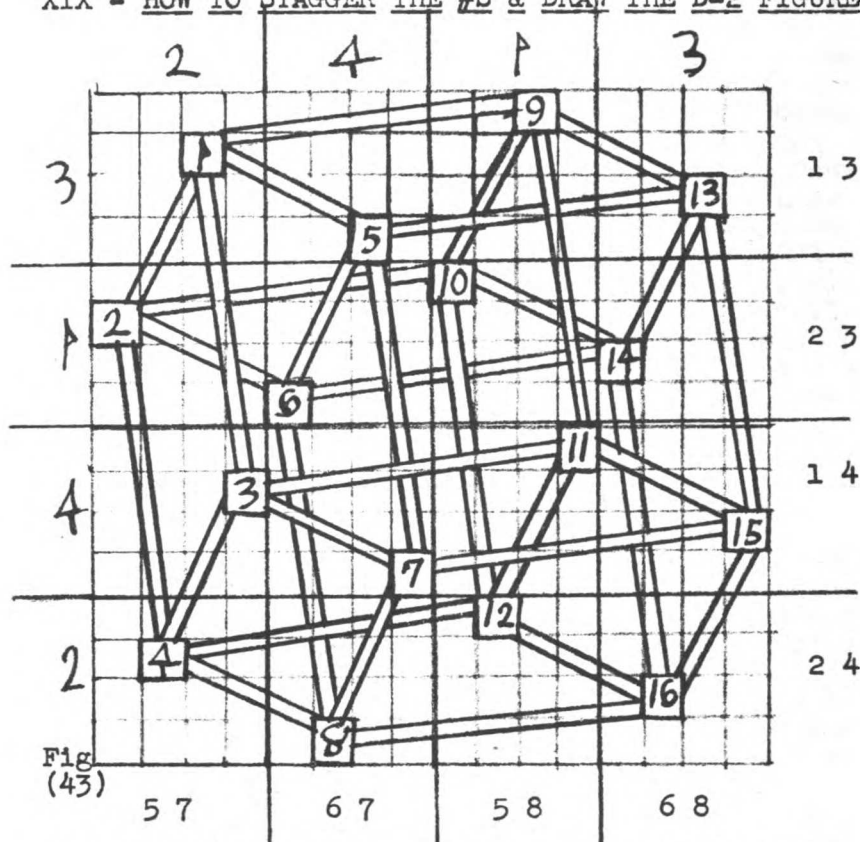
connect the #s, each of which is the meeting place of four crystals (edges), by using the polar differences.



---Fig (42- bis)---

7				8			
5		6		5		6	
3	4	3	4	3	4	3	4
P 2	P 2	P 2	P 2	P 2	P 2	P 2	P 2

## XIX - HOW TO STAGGER THE #S &amp; DRAW THE D-2 FIGURE-

Fig  
(43)

In order to draw this figure neatly, to have the lines clear & overlapping properly, the #s should be staggered in both ways, vertically & horizontally, with the whole figure slightly on the bias. To achieve this rule off a square, as above, Fig (43), into 16 x 16 small squares inside 4 x 4 larger ones. The two marginal indices, top & left, show how to count, down & across (toward the right), to reach the small square for the # inside the 16th appropriated to it. E.g., #5 is 4 down & 3 across in the space where the metals 13 & 67 meet; #11 is 1 down & 4 across in the space where metals 14 & 58 meet to make this point. The right & bottom parameters show the constituent metals of the several points. When it is desired not to show the guide lines locate the #s on a second sheet laid over the first where they are first worked out, as we

did with Fig (42). If the figure is made with straws tied together it can be unfolded or opened out; then the formula for bridging or lapping-over is important; if the #s are connected in the fol-

lowing sequence the over & under relationship will be as it is wanted. One, three, eleven, nine, fifteen, three, seven,

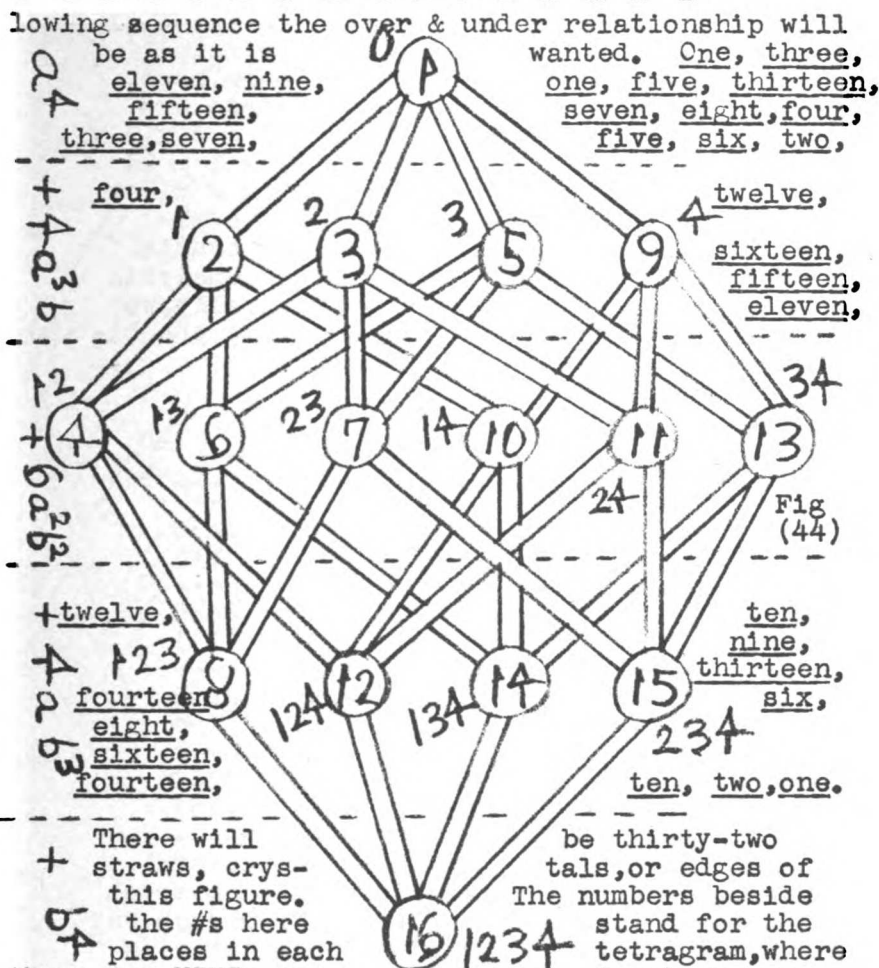
four, twelve, sixteen, fifteen, eleven,

ten, nine, thirteen, six,

ten, two, one.

There will be thirty-two straws, crystals, or edges of this figure. The numbers beside the #s here stand for the places in each tetragram, where there are YINS, or female grams.

The algebraic formula,  $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$ , shows the five levels of generation;  $a$  is for yang &  $b$  is for yin. Thus, e.g.  $4a^3b$  means 4 #s or tetragrams each of which contains 3 yangs & 1 yin;  $b^4 = 1$  # with 4 yins; etc. The 16 #s are divided into five groups or levels by this formula & the junctions are only between adjacent levels.





XX - METALIC TABLE OF TETRACTIC #S (D-2)-Fig(45)-				Note that
	57	67	58	68
1 3 -	1357	1367	1358	1368
2 3 -	2357	2367	2358	2368
1 4 -	1457	1467	1458	1468
2 4 -	2457	2467	2458	2468
	-----	-----	-----	-----
				the metallic digits of these #s are in the No.1 principal perm,here. There are 4! = 4 x 3 x 2 x 1 = 24

different principal perms of D-2 #s & 2 x 2 x 2 x 2 = 16 polar perms; hence 24 x 16 = 384 total-postures of this figure,&/or its #s. The cradle is 1 3 5 7 Now, if we make an algebraic analysis 2 4 6 8. or allocation of the #s severally,we get the following table,which shows merely the bi-polar components of each #. - Fig (46)-

The grammic constituency of a # can be found by using the plus-one algorithmic method as explained on page 22 et seq. The student can easily work this out.		A		B		=D
Q	J	A	B	A	B	=X
A	A	AAAA	AABA	AAAB	AABB	
		(1)	(5)	(9)	(13)	
B	A	BAAA	BABA	BAAB	BABB	
		(2)	(6)	(10)	(14)	
A	B	ABAA	ABBA	ABAB	ABBB	
		(3)	(7)	(11)	(15)	
B	B	BBAA	BBBA	BBAB	BBBB	
		(4)	(8)	(12)	(16)	

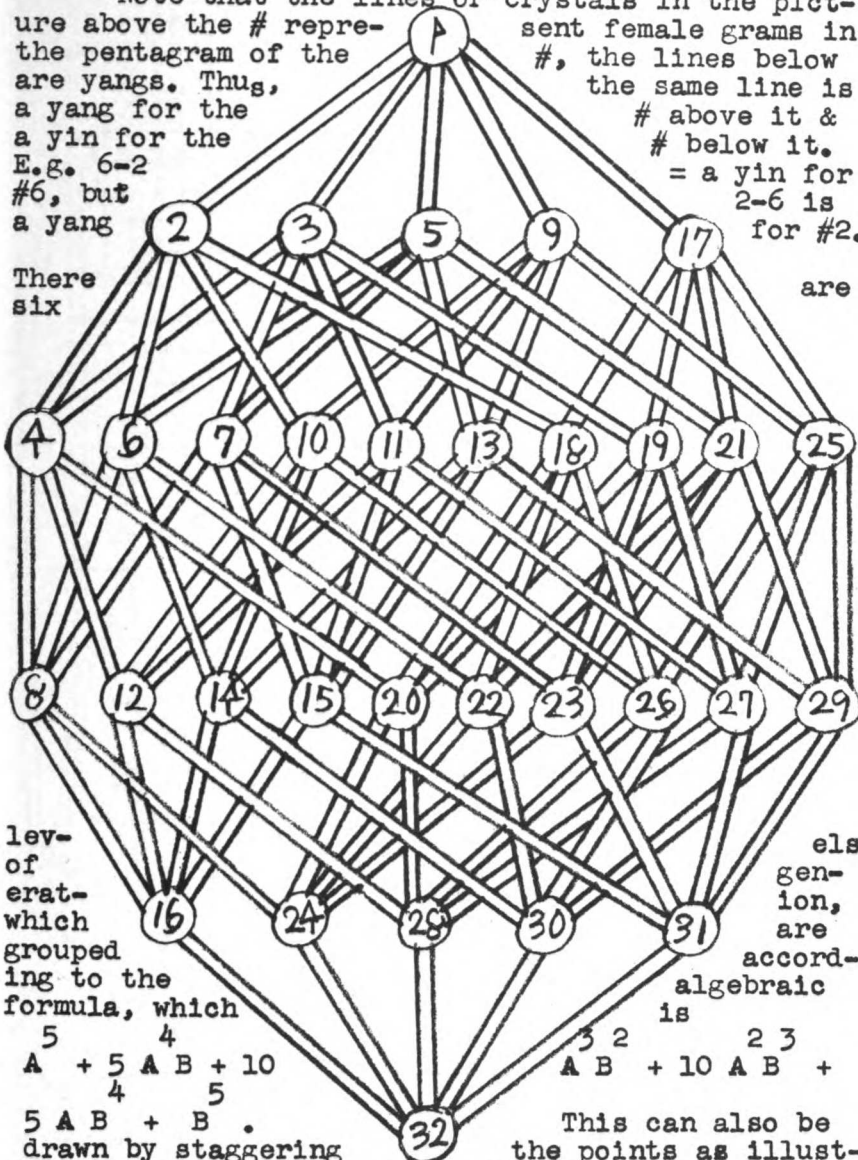
To draw the figure,connecting the #s,note that each crystal must have a pole or end at each sex,on each metal of its principal & four crystals,one from each way meet at each #. Using the combinational terms as shown in Fig (44),page 29,note that "0" goes with "1","2","3" & "4"; "1" goes with "0","12","13" & "14", viz-each combination which contains the digit,"1". "2" goes with "0","12","23", & "24", viz- each combination on the next level with "2" in it. "14" goes with "1","4", above & "124" & "134" below it. the latter two containing the combination "14"; study of these linkages will develop understanding of the system involved,which applies generally.

## XXI - ILLUSTRATION OF H-2= 5-Way, 2-Pole Figure (47)

Note that the lines or crystals in the picture above the # represent female grams in the pentagram of the #, the lines below are yangs. Thus, the same line is a yang for the # above it & a yin for the # below it. E.g. 6-2 = a yin for #6, but 2-6 is a yang for #2.

There are six

are



lev-  
of  
erat-  
which  
grouped  
ing to the  
formula, which

$$\begin{matrix} 5 & 4 \\ A & + & 5 & A & B & + & 10 \\ 4 & & 5 \end{matrix}$$

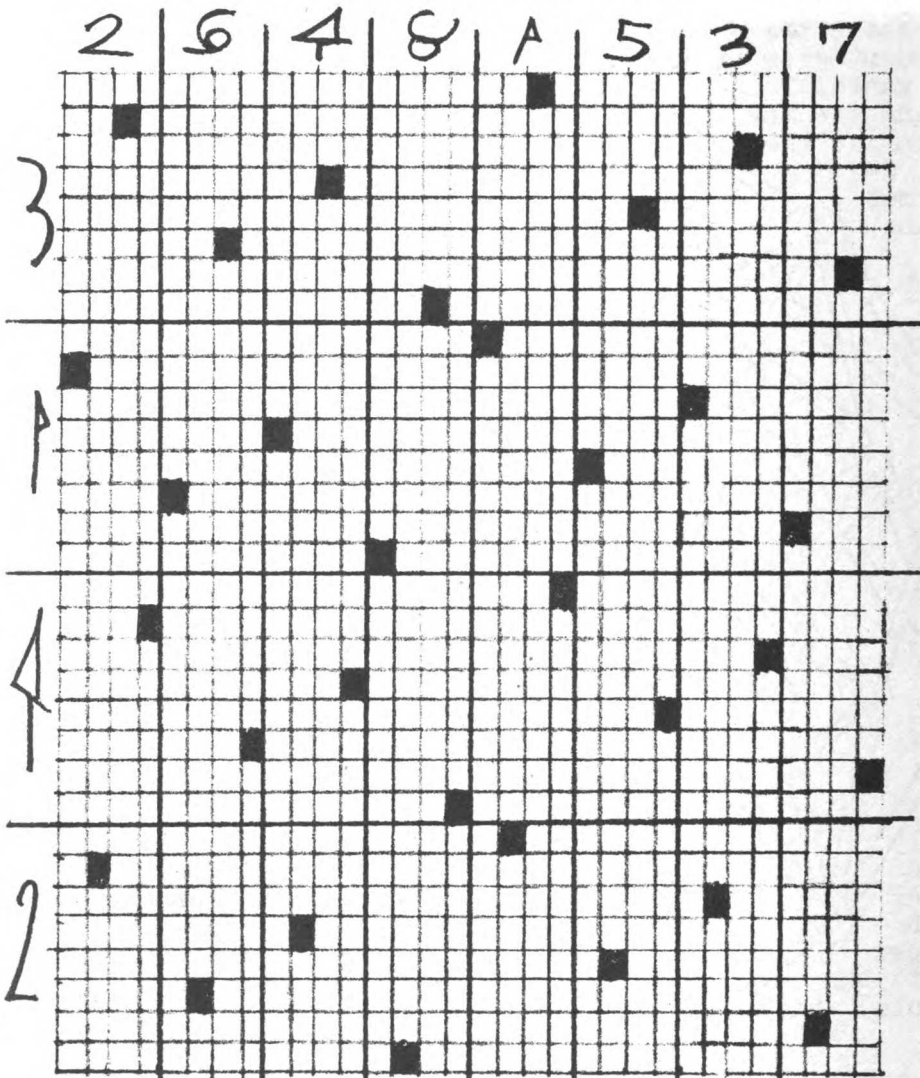
$$5 A B + B$$

drawn by staggering the points as illustrated on the next page. The combinational terms for the above are made simply by counting the grams in the QJXDH sequence & numbering the principals which have female poles, or yins; e.g. #13 = ..xd. = 34.

els  
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ion,  
are  
accord-  
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is

$$\begin{matrix} 3 & 2 & 2 & 3 \\ A & B & + & 10 & A & B & + \end{matrix}$$

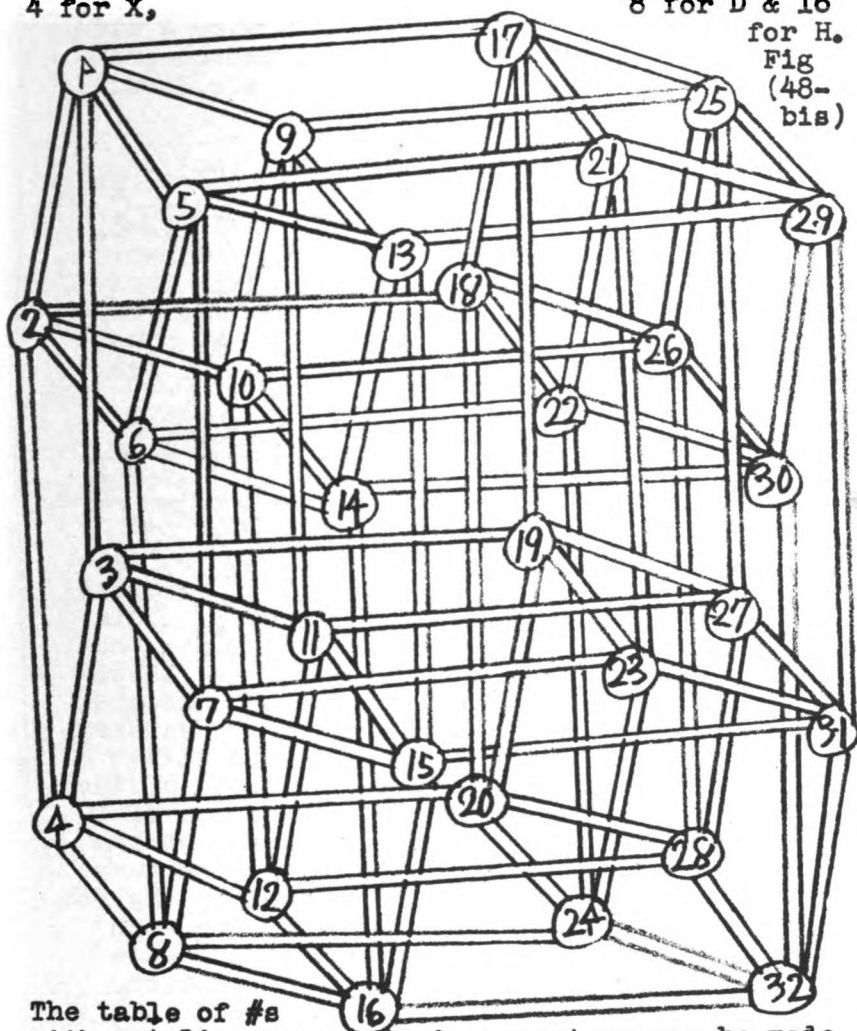
XXII - ILLUSTRATION OF STAGGERING THE #S FOR H-2-  
 Draw a large square eight wide Fig (48)-



by four deep & divide each of these thirty-two squares four wide by eight deep; then count down & across to find the locations as shown above.

XXIII - ILLUSTRATION OF CONNECTING H-2 #S LOCATED  
ON A STAGGERED FRAMEWORK OF POINTS TRACED-  
It is a simple matter to connect the right #s by  
using polar differences, here 1 for salt, 2 for J,  
4 for X, 8 for D & 16

for H.  
Fig  
(48-  
bis)



The table of #s with metallic components & parameters can be made with QJX on the minor margin & DH on the major. Thus, e.g. #15 will be that particle with 146 on the minor & 89 on the major parameter; this can also easily be found by the reverse of the plus-one algorithm, the moduli being 16, 8, 4, 2, & 1, by which successively to divide the given number.

# XXIV - ILLUSTRATION OF V-2 CONNECTED BY MAJOR & MINOR TRIGRAMMIC OR PUNCTUAL PARAMETERS.

The 64 #s are arranged on 7 levels of generation. In linkages, either the major index is the same, in which case there is 1,2, or 4 polar differences; or else the minors are the same, then there is 1,2, or 4 differences between the minors. The coordinates marked on each # are, first major, second, minor.

E.g., #3 = 1-3  
& goes with  
1-1 above  
1-4, 3-3,  
below  
the  
ons  
giv-

A-1 A-2 A-3 A-4 A-5 A-6 A-7 A-8 A-9 A-10 A-11 A-12

- Fig. (49) -

& 1-7, 2-3,  
& 5-3,  
for  
reas-  
just  
en.

A-1 A-2 A-3 A-4 A-5 A-6 A-7 A-8 A-9 A-10 A-11 A-12 A-13 A-14 A-15 A-16 A-17 A-18 A-19 A-20 A-21 A-22 A-23 A-24 A-25 A-26 A-27 A-28 A-29 A-30 A-31 A-32 A-33 A-34 A-35 A-36 A-37 A-38 A-39 A-40 A-41 A-42 A-43 A-44 A-45 A-46 A-47 A-48 A-49 A-50 A-51 A-52 A-53 A-54 A-55 A-56 A-57 A-58 A-59 A-60 A-61 A-62 A-63 A-64

The  
ge-  
form-  
for  
seven  
or  
is found  
(A + B) to  
power; the ex-  
letters show how  
that sex in the  
point. On the next  
combinational method  
viz- work downwards;  
the next lower level  
numbered yin places in

Al-  
braic  
ula  
the  
levels  
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by raising  
the sixth  
ponents of the  
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hexagram of the  
page see the pure  
of connecting the #s:  
link with the # on  
which has the same  
its own combination.

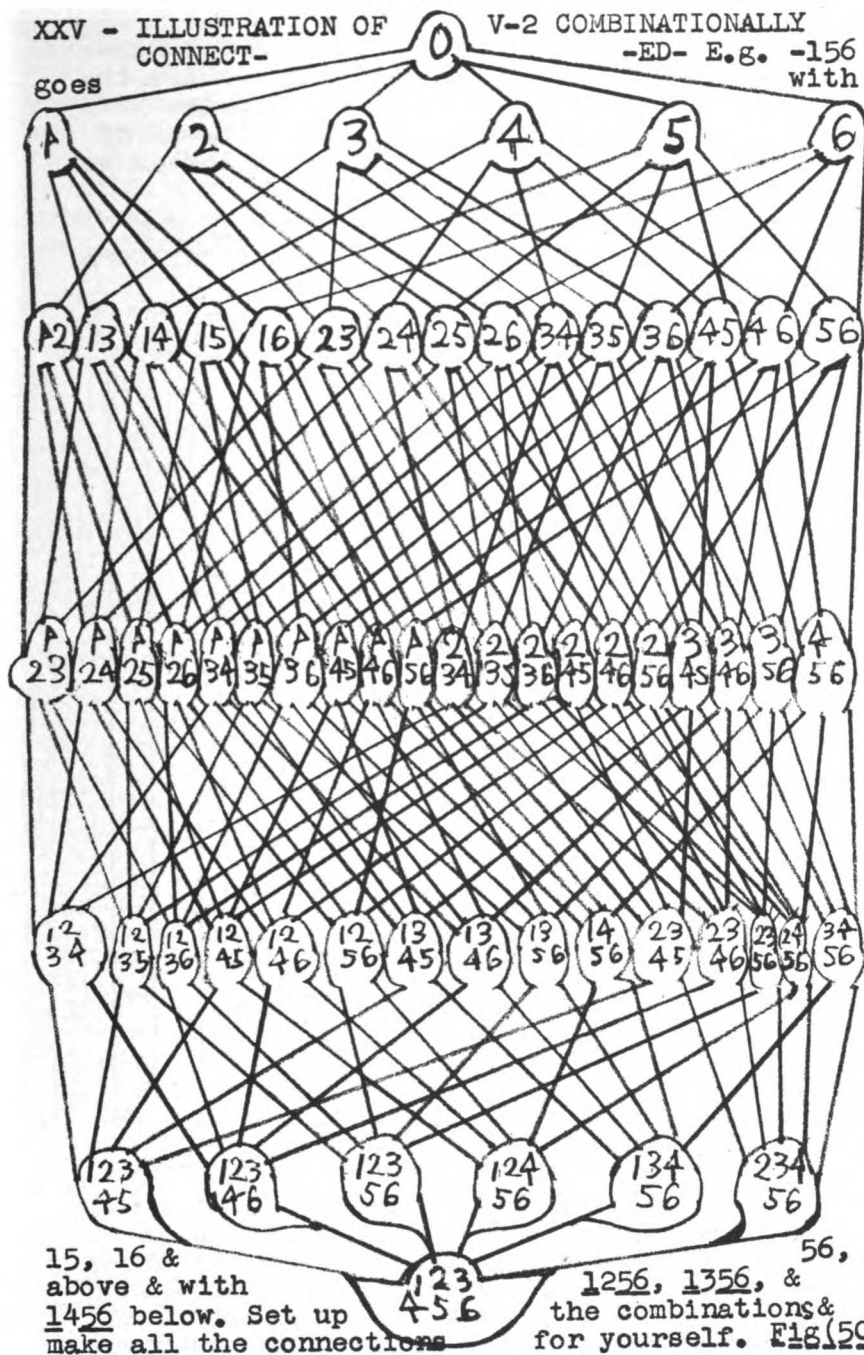
$$6 \quad 5 \quad 4 \quad 2 \quad 2 \quad 4 \quad 5 \quad 6$$

$$A + 6A B + 15A B + 20A B + 15A B + 6A B + B.$$

#1 + (2+3+5+9+17+33) + (4+6+7+10+11+13+18+19+21+25+34+  
35+37+41+49) + (8+12+14+15+20+22+23+26+27+29+36+38+39  
+42+43+45+50+51+53+57) + 16+24+28+30+31+40+44+52+54+  
55+58+59+61) + 32+48+56+60+62+63 + (64) = #s of above.

XXV - ILLUSTRATION OF  
CONNECT-  
goes

V-2 COMBINATIONALLY  
-ED- E.g. -156  
with



XXVI - GENERATIVE TERMS OF THE 64 #s of V-2 ARRAY-  
ED IN THE LOGICAL ORDER- Fig (51) - Here the  
digits are the combinational terms-showing the  
places in each hexagram where there are yins-as of  
the top & left parameters: on the right & bottom we  
see the minor & major punctual parameters.

Thus, e.g., the particle whose minor is 5 &  
the major 6 is the generative or combinational term

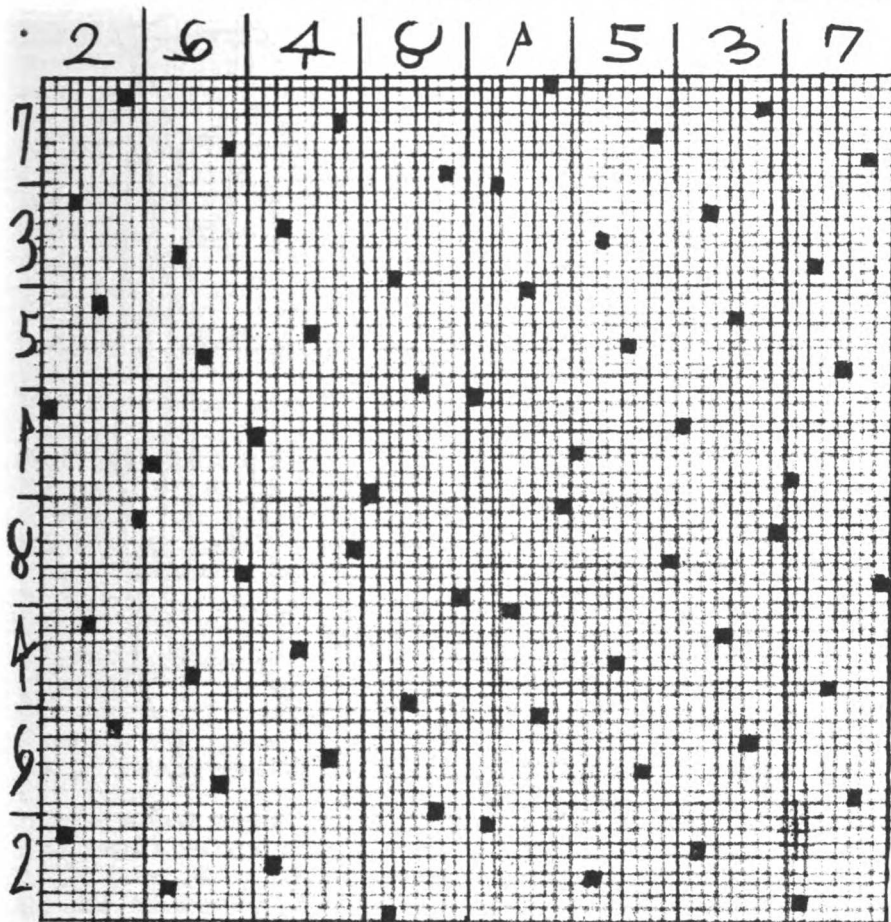
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- Fig (51) - "346", which means that in the  
----- hexagram of this number, the grams in  
the 3rd, 4th & 6th places are yins - the other three  
grams are yangs; the polar expression of this #, then  
is 1 1 2, 2 1 2. But 112 = 5 & 212 = 6, hence this  
#45 = 5 x 6 - viz- 6 major & 5 minor, on the punctual  
parameters (bottom & right), as shown above, here.



## XXVII - ILLUSTRATION OF STAGGERING THE #S FOR V-2 -

Draw a large square, 8 x 8 & divide each of these sixty-four squares, also into 8 x 8; then write the numbers, to count down, across the top- 2, 6, 4, 8, 1, 5, 3, 7 & down the left margin, the numbers to count across, viz- 7, 3, 5, 1, 8, 4, 6, 2. The #s to connect will be the tiny squares where these criss-cross countings meet, as, e.g. with the hexagrammic #



5 x 6 = #45, found in the 64th where -Fig (52)- minor 5th meets major 6th; in this we count down five & over eight to find the tiny square in which to locate the #. On the next page we have traced the above locations in order to draw the V-2 geometrical figure itself; six dimensions, two poles in each.

XXVIII - ILLUSTRATION OF V-2 DRAWN ON STAGGERED FRAMEWORK - The #s can be connected simply by using the six polar differences- 1 for Q, 2 for J, 4 for X, 8 for D, 16 for H, 32 for V, added or subtracted from the number of the # as given, here.

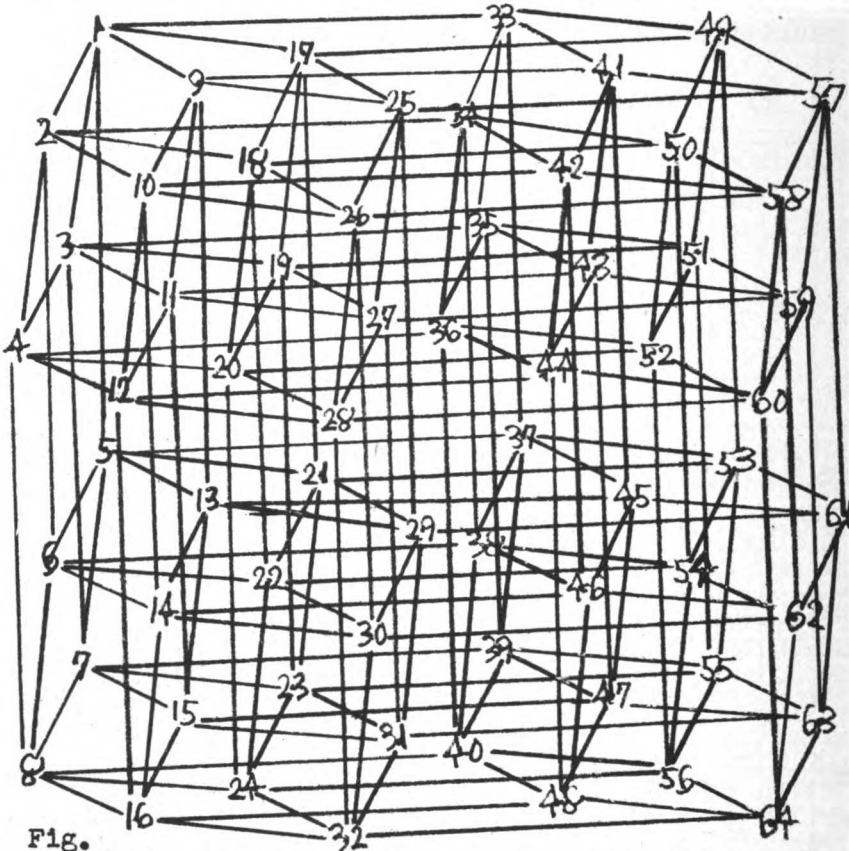


Fig.

----(53)-- There are three minor plus three major crystals from each #. With 64 #s in the whole figure,  $6 \times 64 = 384$ , which must be divided by 2, since 2 #s make one crystal, then  $384/2 = 192$  crystals in all. Or, we may calculate this same sum another way: Divide 64 by 2 = 32 #s on each pole of the six dimensions to be connected each with the other pole, making 32 crystals in each principal, times 6 ways (principals) =  $6 \times 32 = 192$  crystals, or lines in the above V-2 geometrical figure. It is also possible to calculate all categorical parts, such as #s, lines, surfaces, cubes, tetraks, pentraks, & sextraks.

XXIX - STRUCTURAL DESCRIPTION - We can classify figures according to their punctual quantity, linear quantity, or according to the number of planes they contain, or the number of solids, or tetraks, or pentraks, or sextraks, or higher configurations & the primitives of these are principals & degrees in each. With the data, numerical & otherwise, fixed & the rules & conditions of structure, we can build up certain geometrical figures & acquire a definite knowledge of their categorical parts. The sort of figure described here is called "closed", for all of its #s are connected with other #s, there are no loose ends, or lines left dangling. Each figure is in the first place a set of points, next it is a set of lines, then of surfaces, then of solids, & so on; these are its categories. A set of connected #s where every # in the set is connected with every other # in the same set is called a complete point-set. Figures are symmetrical when their various parts of the same category are congruent. The degree of a # is counted by the number of different categories of which it is a part. When a # is part of a set it is said to be "on" that set & the set is also "on" it. If one whole set is part of another whole set, whether of the same or a higher or lower sort, we say that the one set is on the other & vice versa. Thus "on" is synonymous with "intersection". If two #s intersect or are on each other, they are totally congruent. If two lines, which are 2# sets, are wholly congruent, then both #s of each line would be on the #s of the other line, respectively, but this respective congruence might or might not constitute a correspondence of similarity or analogy, for each figure has form, or order, arrangement of its component parts.

Suppose two lines which are 2# sets to have numbers ascribed to their #s as #1 & #2. Call the one set A & the other B, then we have four #s : A-1, A-2; B-1, B-2. If now we make the two sets, A & B, congruent, #A-1 may coincide with B-1 or B-2, then A-2 will be on whichever # is left, viz- B-2 or B-1; thus there are two congruent possibilities here.

Now, call the two #s of A, 1 & 2 & those of B, 3 & 4. According to the system of numbering, 1 is to 2 as 3 is to 4. Then if the chosen congruence be 1 with 3 & 2 with 4 it is similar or analogous; if it be 1 with 4 & 2 with 3, it is dissimilar or incongruous. If we take the particular position,

posture or change of A, as 1 - 2, as the idemfactor, then 3 - 4 will be the idemfactorial posture of B; since, in this case only two different postures of a figure are possible, we can call the posture, 2 - 1, or 4 - 3, reciprocal, or simply, reverse. The figure, A, or B, has but one dimension or principal, but it has two poles or degrees. If we take a straight line, C, which contains three #s, say, 5, 6 & 7, then we have a figure or #-set in one principal with three poles, or a 1-way, 3-degree figure.

XXX - STRUCTURAL FORMULAS & TABULATION - Each geometrical figure or structure can be described in terms of its categorical parts & their relationship with each other. Thus in a figure which is a complete 2# set, the degree of a # may be specified with respect to each category of the figure, & similarly with the line which is the other categorical part of this figure..thus, there is one line (the same line, by the way) on each # of the figure; there are two #s on each line of the figure. Considering complete point-sets we can begin to tabulate them as follows. ---Fig. (54)---

Figure	1# sets	2# sets	3# sets	4# sets	5# sets	6# sets
A-	1	.	.	.	.	.
B-	2	1	.	.	.	.
G-	3	3	1	.	.	.
D-	4	6	4	1	.	.
H-	5	10	10	5	1	.
V-	6	15	20	15	6	1

-----  
 Thus, Figure A, here, is a complete #-set with one # in the set & by definition, every # in this set is connected with every # (itself & other) in the same set. Fig. B is a complete 2#-set, similarly connected; it contains two 1# sets & one 2# set. Fig. G is a complete 3# set (viz= graphically, a triangle), containing three 1# sets, three 2# sets & one 3# set. Fig. D is a complete 4# set, containing four 1# sets, six 2# sets, four 3# sets & 1 4# set, graphically a tetrahedron. Fig. H is a complete 5# set, containing 5 1# sets, 10 2# sets, 10 3# sets, 5 4# sets & 1 5# set, graphically D-1, or a species of one-degree tetrak with four lines meeting at each #, & so on. The formula for finding the combinations of the above table is that for getting the combinations of N things taken R at a time, viz-  

$$(1 \times \frac{N \times (N-1) \times (N-2) \dots \times (N-R+1)}{R}) = R! \text{ numerator of}$$

this fraction is the product of the descending digits for the same number of terms as the digits of the denominator ascend from 1 to R. E.g., the number of combinations of five things taken three at a time ( $N = 5, R = 3$ ) is  $\frac{5 \times 4 \times 3}{1 \times 2 \times 3} = \frac{60}{6} = 10$ , where each of the five #s

in the 5# set, to make a sub-set of three #s. Thus there are ten 3# sets low in Fig (55) we show Note the location & number of each of the parts. There are

$$\frac{5 \times 1}{1} = 5 \text{ 1# sets.}$$

be the coefficient term in the expansion to the 5th power, found by dividing of the coefficient second term by ponent of A, by the number of term whose ficient & ponent are Thus,

$$\frac{5 \times 4}{2} = 10.$$

The number of 3# sets, (triangles) =  $\frac{10 \times 3}{3} = 10$ .

The number of 4# sets (tetrahedrons) =  $\frac{10 \times 2}{4} = 5$ .

The number of 5# sets =  $\frac{5 \times 1}{5} = 1$ , which is the coefficient of  $B^5$ .

$$A^5 + 5A^4B + 10A^3B^2 + 10A^2B^3 + 5AB^4 + B^5$$

Now, the 1# sets of Fig (55) are #1, #2, #3, #4 & #5. The 2# sets are 1-2, 1-3, 1-4, 1-5, 2-3, 2-4, 2-5, 3-4, 3-5, 4-5. The 3# sets are 1-2-3, 124, 125, 134, 135, 145, 234, 235, 245, 345. The 4# sets are 1234, 1235, 1245, 1345, & 2345. The 5# set is 1-2-3-4-5.

XXXI - THE BI-POLAR THEOREM - The Binomial Theorem gives the categories for complete # sets. Now let us consider # sets whose principals have two poles or degrees in each, such that each # goes with only a limited number of other #s, not all.

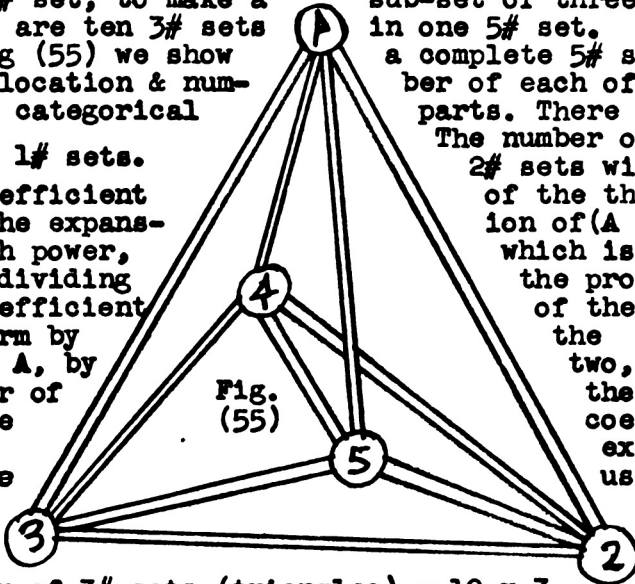


Fig. (56) - - - Here, the first term of the expansion is the # of 1# sets in the figure;

$(2+1)^0 = 1 = 1$  the second term is the number of 2# sets in the figure; the 3rd

$(2+1)^1 = 2 + 1 = 3$  term is the number of 3# sets in the figure, &

$(2+1)^2 = 4 + 4 + 1 = 3^2 = 9$  so on, with 8#, 16#, 32# sets, etc.

$(2+1)^3 = 8 + 12 + 6 + 1 = 3^3 = 27$

$(2+1)^4 = 16 + 32 + 24 + 8 + 1 = 3^4 = 81$

$(2+1)^5 = 32 + 80 + 80 + 40 + 10 + 1 = 3^5 = 243$

$(2+1)^6 = 64 + 192 + 240 + 160 + 60 + 12 + 1 = 3^6 = 729$

-----  
1#    2#    4#    8#    16#    32#    64# sets.  
-----

XXXII - THE TRI-POLAR THEOREM - Here, we have fig-

$(3+1)^0 = 1 = 1 = 4^0$  Fig(57) - ures with three poles in each principal;

$(3+1)^1 = 3 + 1 = 4 = 4^1$  the first term is the number of 1# sets, the

$(3+1)^2 = 9 + 6 + 1 = 16 = 4^2$  2nd is the number of 3# sets; the 3rd

$(3+1)^3 = 27 + 27 + 9 + 1 = 64 = 4^3$  is the number of 9# sets, the 4th

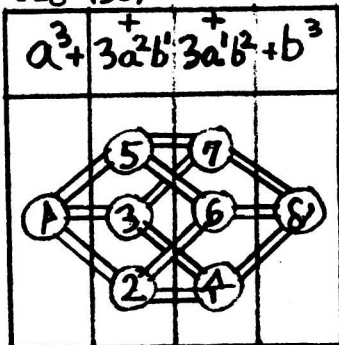
$(3+1)^4 = 81 + 108 + 54 + 12 + 1 = 256 = 4^4$  of 27# sets.

$(3+1)^5 = 243 + 405 + 270 + 90 + 15 + 1 = 4^5 = 1024$

-----  
XXXIII - CATEGORICAL PARTS OF G-2 = BIPOLAR 8# SET-

This is the common second

-Fig (58)-



degree  
cube.

	1#	2#	4#	8#
In	1	2	4	8
the	3	1	4	12
table	4	3	2	6
here	8	1	1	1
the				

majors are the # sets in the cube Fig(58-b)

= an 8# set & the minors are the # sets contained in the majors as they are contained in the cube itself.

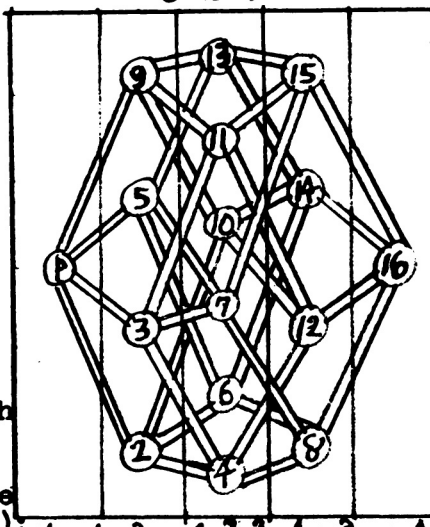
Thus, the cube contains 8 1# sets (reading the 4th major file), 12 2# sets (edges or crystals), 6 4# sets (sides or metals), & 1 8# set (cube).

XXXIV - CATEGORICAL PARTS OF D-2 = TETRAK(2nd deg)  
= BIPOLAR 16# SET- - Fig (59) -

	1#	2#	4#	8#	16#
1# -	1	2	4	8	16
2# -	4	1	4	12	32
4# -	6	3	1	6	24
8# -	4	3	2	1	8
16# -	1	1	1	1	1

Fig (59-bis) -

----- Here, we see the figure & its table of categorical parts, which answers the question, e.g. how many squares (4# sets) on each cube (8# set) of the 16# set? = six. Or, e.g., how many cubes on each square (= 8# sets on each 4# set), i.e., given any particular square of the figure, say



#1-3-9-11, how many different cubes have this same square as one of their sides, respectively? The answer is two. Again, how many 2# sets on each 8# set, i.e. how many lines on each cube; the answer is 12. How many cubes on each line, viz- 8# sets on each 2# set? The answer is 3.

XXXV- CATEGORICAL PARTS OF H-2 = 2nd deg. PENTRAK =  
BIPOLAR 32# SET \* Fig (47) - (\*page 31) - -

Fig (47-bis) - - answers

such questions as - How many 1# 2# 4# 8# 16# 32# squares on each point?

The answer is  $\frac{5 \times 4}{1 \times 2} = 10$ .

Or, say, how many lines

on each tetrak = 32. Or,

say, how many tetraks

on the same line = 4,

& so on, with the interpretation

of the whole table, here, Fig (47- bis ).

This requires careful & exhaustive study.

	1#	2#	4#	8#	16#	32#
1# -	1	2	4	8	16	32
2# -	5	1	4	12	32	80
4# -	10	4	1	6	24	80
8# -	10	6	3	1	8	40
16# -	5	4	3	2	1	10
32# -	1	1	1	1	1	1



XXXVI - CATEGORICAL PARTS OF V-2 = 2nd deg. SEXTRAK  
= BI-POLAR 64# set- see fig (53) page 38.

Here we find the answers to the  
Fig (53- bis)- same sort of questions as already

V-2	A#	2#	4#	8#	16#	32#	64#
A#	1	2	4	8	16	32	64
2#	6	1	4	12	32	80	192
4#	15	5	1	6	24	80	240
8#	20	10	4	1	8	40	160
16#	15	10	6	3	1	10	60
32#	6	5	4	3	2	1	12
64#	1	1	1	1	1	1	1
	POINT	LINE	SQUARE	CUBE	TETRAK	PENTAK	SEXTRAK

considered with respect to the other bi-polar figures. Six lines meet at each #; there are five squares on each line; four cubes on each square; ten tetraks on each line, & so on. The calculation of the answer is by the bi-polar theorem: see Fig(56).  
E.g. =  $64 \times 15/16 = 60$  for 16# sets on the 64# set figure.

## XXXVII - CATEGORICAL PARTS ON PARTS OF G-3 -see

Fig ( 28) - Here we have a trichotomous situation in which each line is divided into thirds for the three #s which comprise the line; then the generations of #s can be found by raising three-thirds to the required power. (See section III, 15 of Book PIH, page III, 9). Fig (28 - bis) -

Here we have 2 squares, (9# sets) on each line, (3# set); & six lines on each square; & so on.

	1#	3#	9#	27#
1#-	1	3	9	27
3#-	3	1	6	27
9#-	3	2	1	9
27#-	1	1	1	1

## XXXVIII - CATEGORICAL PARTS

ON PARTS OF D-4 =

4-way, 4-degree figure. This

can be constructed easily by making first the outline of D-2 according to the stagger-system of Fig (43), then add two #s to each line, making the extra in-between lines that are necessary. The table is shown here in Fig. (60).

1# 4# 16# 64# 256#

The size of the pages of this book prevents drawing this figure here with clarity, but the student should make it up on a large sheet for practice.

1#-	1	4	16	64	256
4#-	4	1	8	48	256
16#-	6	3	1	12	96
64#-	4	3	2	1	16
256#-	1	1	1	1	1

## XXXIX - CO-ORDINATE TRANSFORMATIONS - D-2 EXAMPLE-

The punctual metallic table of the 16#s of this figure is shown in Fig (45), page 30. The metallic cradle is 1 3 5 7, which has  $4! = 24$  principal perms & 2 4 6 8,  $2^4 = 16$  polar perms, so that, all told, there are  $24 \times 16 = 384$  changes of this D-2 figure. (Tetrak). In the idem the first place is occupied by #1 = 1357 metallically. Now, let us put in the first place the postured point whose crystoperm = 4627, then the new cradle of this will be 4 6 2 7 & the first minor of the new punctual 3 5 1 8 metallic table will have 46 as the ordinate or minor index & 27 as the abscissa or major index. From the new cradle we derive the new parameters in the same way that the idemfactorial cradle yields the parameters of the Fig (45), q.v.

The first major of the cradle gives the ordinates in sequence for the first digits of the minor parameter, thus- 1 for the idem & 4 for the new change. Compare 2 the cradles & 3 tables as

shown below in Fig's (61) & (62). The second major of the cradle gives the second digits of the minor parameter, thus: Idem = 3 & 6 for the new change.

1 3 5 7  
2 4 6 8

3 6  
4 5  
4 5

4 6 2 7  
3 5 1 8

	<u>57</u>	<u>67</u>	<u>58</u>	<u>68</u>		<u>27</u>	<u>17</u>	<u>28</u>	<u>18</u>
<u>13</u> -	1	5	9	13	<u>46</u> -	8	7	16	15
<u>23</u> -	2	6	10	14	<u>36</u> -	6	5	14	13
<u>14</u> -	3	7	11	15	<u>45</u> -	4	3	12	11
<u>24</u> -	4	8	12	16	<u>35</u> -	2	1	10	9

The third major of the cradle gives the first digits of the major parameter, as 5 . 6 . 5 . 6. for the idem & for the new change, 2 . 1 . 2 . 1. & the cradle's fourth major gives the major parameter's second digits, thus: idem = . 7 . 7 . 8 . 8 . Consequently, the /new change = . 7 . 7 . 8 . 8 . whole parameters become as shown above in the Fig (61) & Fig (62). The particular #s in each are those which combine the metallic co-ordinates, which can be found identically from the idem, es. e.g., 45-17 is the same # as 14-57, viz #3; the arrangement of the metallic digits in the # shows the posture of the #, which will be the same for all 16 in the table, viz, for the idem = as 1357 & for the other = 4627, the # in first place, all #s in the figure being uniformly postured. Note that the same result can be achieved by using a grammic scheme, or by a combinational process. Thus, with grams, the major parameter of the idem is -

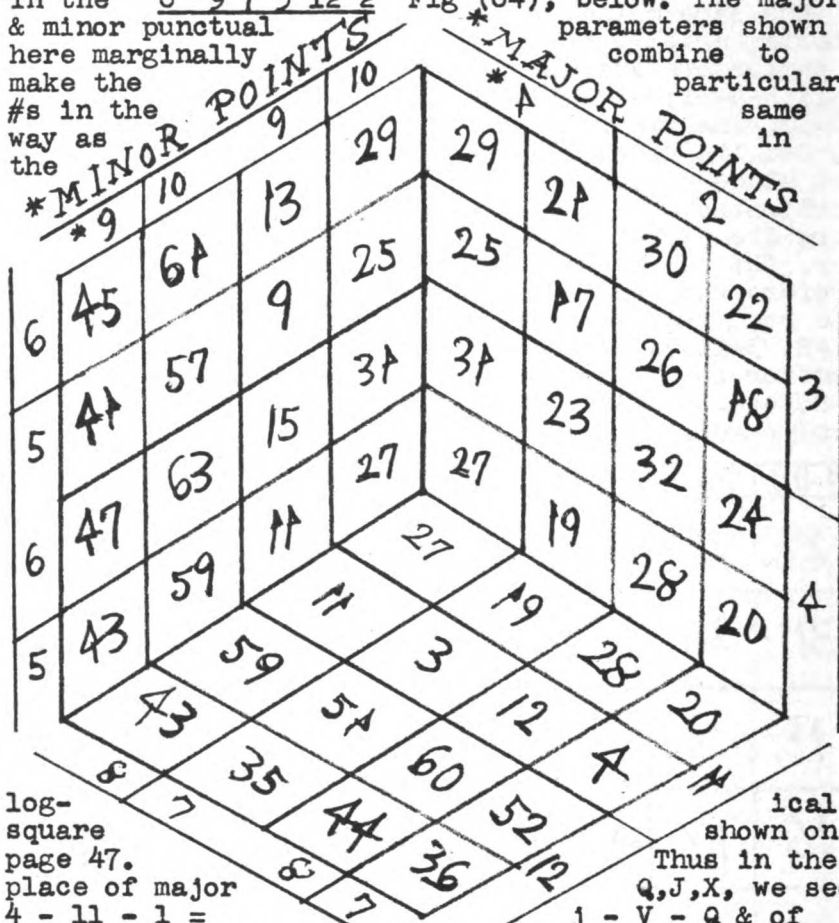
<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>	WHEREAS the
<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>	major paramet-
.	.	.	.	.	er of the new
.	.	.	.	.	change is -

These same parameters can be expressed as combinational terms, thus for the new change, we get the major = 1 - 0 - 14 - 4 & the minor of the same = (reading down) 23 - 3 - 2 - 0. Thus, the #s or particles are sums of the co-ordinates, respectively-e.g. where the minor is "3" & the major "14", the particle = "134" = "2368" or "3628", postured.

XL - CONCERNING V-2 TRANSFORMATIONS - Now, apply the same method to the V-2 figure whose idem-factorial metallic cradle is 1 3 5 7 9 11  
The parameters are: major- 2 4 6 8 10 12.  
7-9-11; 8-9-11; 7-10-11; 8-10-11; 7-9-12; 8-9-12; 7-10-12; 8-10-12. The minor is 135, 235, 145, 245, 136, 236, 146, 246, (to be read down). Now put, say #27 in the first place postured as "5-10-8-4-11-1"; then the co-ordinates of the first # of the new logical square are 5-10-8 for the minor & 4-11-1 for the major. The new metallic cradle is 5 10 8 4 11 1 therefore the major parameter 6 9 7 3 12 2; is to read (across)-4-11-1, 3-11-1, 4-12-1, 3-12-1, 4-11-2, 3-11-2, 4-12-2, 3-12-2, whereas the minor parameter is to read (down)- 5-10-8, 6-10-8, 5-9-8, 6-9-8, etc. The form is the same as Fig (53), but the punctual array is transformed as below- Fig.(63) - -

	4-11-1	3-11-1	4-12-1	3-12-1	4-11-2	3-11-2	4-12-2	3-12-2
8 10 5	27	25	59	57	28	26	60	58
8 10 6	31	29	63	61	32	30	64	62
8 9 5	11	9	43	41	12	10	44	42
8 9 6	15	13	47	45	16	14	48	46
7 10 5	19	17	51	49	20	18	52	50
7 10 6	23	21	55	53	24	22	56	54
7 9 5	3	1	35	33	4	2	36	34
7 9 6	7	5	39	37	8	6	40	38

XLI - ILLUSTRATION OF THE V-2 CHANGE WHOSE CRADLE IS 5 10 8 4 11 1. Logically, this can be as in the 6 9 7 3 12 2 Fig (64), below. The major & minor punctual parameters shown here marginally combine to make the particular #s in the way as same in the



log-square  
page 47.  
place of major  
4 - 11 - 1 =

minor Q, J, X we see

The primary diagonal of this figure as shown in cubic form above is #27- #7- #58 - #38.  
The V-2 cradle &/or figure has  $6! = 720$  principal perms times  $2^6 = 64$  polars = 46,080 changes. The above is found by the plus-one algorithm to be No. 18,237.  
Thus, the occupancy formula =  $12 \times 10 \times 8 \times 6 \times 4 \times 2$  & the Moduli = 3840, 384, 48, 8, 2, 1; the O-R of 5-10-8-4-11-1 are 4-7-5-3-2-0, x the Mod. = 15,360 + 2,608 + 240 + 24 + 4 + 0, + 1 = 18,237. The student should work out many examples of each problem to fix the rules & conceptions in the mind. Thanks to everything!

ical  
shown on  
Thus in the  
Q, J, X, we see  
j - V - Q & of  
5 - 10 - 8 = x - h - d.









